CONTENTS

Page

Notices to Subscribers iii
Federal Regional Technical Report Centers vi
List of U. S. Government Research Reports Cumulative Indexes vi

Section I: TECHNICAL ABSTRACT BULLETIN

Subject Divisions

1 Aircraft and Flight Equipment 1
2 Astronomy, Geophysics, and Geography 7
3 Chemical Warfare Equipment and Materials 17
4 Chemistry 19
5 Communications 25
6 Detection 28
7 Electrical Equipment 31
8 Electronics and Electronic Equipment 34
9 Fluid Mechanics 50
10 Fuels and Combustion 58
11 Ground Transportation Equipment 60
12 Guided Missiles 61
13 Installations and Construction 64
14 Materials (non-Metallic) 66
15 Mathematics 69
16 Medical Sciences 94
17 Metallurgy 99
18 Military Sciences and Operations 106
19 Navigation 111
20 Nuclear Physics and Nuclear Chemistry 113
21 Nuclear Propulsion ..... No Entries
22 Ordnance 118
23 Personnel and Training 120
24 Photography and other Reproduction Processes 123
25 Physics 124
26 Production and Management 147
27 Propulsion Systems 152
28 Psychology and Human Engineering 154
29 Quartermaster Equipment and Supplies ..... No Entries
30 Research and Research Equipment 159
31 Ships and Marine Equipment 164
32 Miscellaneous Arts and Sciences 165
33 Transportation 171

Subject Index NI-1
AD Number Index I-1

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
Donald A. Schon, *Director*

Issued twice a month. Annual subscription $15 ($3.75 additional for foreign mailing). Single copy $1. Make remittance payable to Superintendent of Documents and mail either to a U.S. Department of Commerce Field Office or to Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Address changes should be sent to Superintendent of Documents.

Contents may be reprinted freely. Mention of source will be appreciated.

Use of funds for printing this publication approved by the Director of the Bureau of the Budget, June 30, 1961.

U.S. Government Research Reports

This publication is issued twice a month to announce new reports of research and development released by the Department of Defense and certain other agencies of the Federal Government sponsoring research and development programs. Unless otherwise indicated, reports listed are available from the Office of Technical Services. The documents are available in original, reproduced, or microfiche copy only.

The first section of U. S. Government Research Reports (USGRR) is prepared for the Defense Documentation Center and is called "Technical Abstract Bulletin" (TAB). (DDC is a Department of Defense agency which services DOD agencies and their contractors with military research information.) The next section is called "Non-Military and Older Military Research Reports." Here are listed new reports of civilian agencies of the Government and military research reports not to be found in the "TAB." Most of these older military reports have been acquired by OTS in response to specific industry requests.

Atomic Energy Commission reports available from OTS are listed in Nuclear Science Abstracts. NSA is available to the general public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at $30 a year (domestic), $37 a year (foreign). Single copy cost, $1.75 (plus 25 percent for foreign mailing).

National Aeronautics and Space Administration reports available from OTS are listed in Scientific and Technical Aerospace Reports. STAR is available to the general public on subscription from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at $25 a year (domestic), $31 a year (foreign). Single copy, $1.50 (plus 25 cents for foreign mailing).

How To Order Reports

Almost all reports listed in USGRR are available from the Office of Technical Services, U. S. Department of Commerce, Washington, D. C., 20230, or may be ordered through any Department of Commerce Field Office. Prices are given with each entry. Hard copy price is indicated by the letters "HC"; microfiche price is indicated by the letters "MF." Please use the identification numbers (AD number, PB number) and titles of reports when ordering. Also use accession numbers when ordering documents listed in NSA and STAR. Prepayment is required or purchases can be charged to Superintendent of Documents deposit accounts.

For reports available from GPO only, address your order and make check or money order payable to Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 20402.

When any report is available from a source other than OTS or GPO, the name and address of that source will be given. Direct your order to that address and not to OTS.

NOTICE TO SUBSCRIBERS

New Standard Pricing Schedule

For

Original, Reproduced, or Microfiche Copies of Documents

The new OTS pricing schedule for original or reproduced copies is retroactive except where the previously announced price of printed documents is lower. When the existing stocks of printed documents are depleted and must be reproduced, the new price schedule will apply. Normally, documents which were announced more than one year ago will not be in printed form. The new standard schedule in general is 1/3 lower than the average previous prices.

Standard Price Schedule for Original or Reproduced Copies (HC)

Pages	
1 - 25	$1.00
26 - 50	2.00
51 - 100	3.00
101 - 150	4.00
151 - 200	5.00
201 - 300	6.00
301 - 400	7.00
401 - plus	7.00 plus .01 per page in excess of 400 pages

OTS has changed its system of microphotography from microfilm to microfiche (a unitized sheet form of microphotography). All documents announced by OTS subsequent to July 15, 1964, are available either in original, reproduced, or microfiche copy only.

OTS will use the International Standard size of microfiche sheet of 105 mm. x 148 mm. (approximately 4" x 6"). Image size will be generally an 18:1 reduction. If a document contains 57 pages or less, normally only one sheet of microfiche will be necessary. "Trailer cards," or cards in addition to the first will be used for the additional pages.

Standard Price Schedule for Microfiche (MF)

Method of Purchase	Microfiche Price
Individual Document Orders	$ .50 for 1st sheet plus .25 for each trailer sheet
Automatic Distribution* (by Issuing Agency), e.g., all NASA, all AEC, all DDC, etc.)	$ .40 for 1st sheet plus .25 for each trailer sheet
Automatic Distribution of all reports or all translations available from Clearinghouse in microfiche	$ .25 for 1st sheet plus .25 for each trailer sheet
Additional copies of the same document requested with the original order	$ .25 for 1st sheet plus .25 for each trailer sheet

*Automatic distribution by subject category, through advance subscription, will be announced in the near future.

Pricing schedules for sale of magnetic (computer) tapes, new journals, catalog cards, fee literature searches, and other bibliographic materials will be announced later.

CONTENTS (Con.)

Section II: NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

Subject Divisions	Page
1 Aircraft and Flight Equipment	S-1
2 Astronomy, Geophysics, and Geography	S-1
3 Chemical Warfare Equipment and Materials	No Entries
4 Chemistry	No Entries
5 Communications	S-1
6 Detection	No Entries
7 Electrical Equipment	No Entries
8 Electronics and Electronic Equipment	No Entries
9 Fluid Mechanics	No Entries
10 Fuels and Combustion	No Entries
11 Ground Transportation Equipment	No Entries
12 Guided Missiles	No Entries
13 Installations and Construction	No Entries
14 Materials (Non-Metallic)	No Entries
15 Mathematics	No Entries
16 Medical Sciences	S-1
17 Metallurgy	No Entries
18 Military Sciences and Operations	No Entries
19 Navigation	No Entries
20 Nuclear Physics and Nuclear Chemistry	No Entries
21 Nuclear Propulsion	No Entries
22 Ordnance	No Entries
23 Personnel and Training	S-4
24 Photography and Other Reproduction Processes	No Entries
25 Physics	S-4
26 Production and Management	S-5
27 Propulsion Systems	S-5
28 Psychology and Human Engineering	S-5
29 Quartermaster Equipment and Supplies	S-6
30 Research and Research Equipment	S-7
31 Ships and Marine Equipment	No Entries
32 Miscellaneous Arts and Sciences	S-7
33 Transportation	No Entries
Subject Index	S-9
Number Index	S-9

SPECIAL LITERATURE SEARCHING FEE INCREASED

Effective October 1, 1964, the fee for Special Literature Searches by the Office of Technical Services and the Science and Technology Division, Library of Congress, is increased from $8 per hour to $11 per hour of searching time. The increase is necessary to permit the agencies to recover the actual costs of these searches.

The Special Literature Searching Service is a subscription-type service to provide subscribers with bibliographic information tailored to their specifications. For information on this service, write to OTS, U. S. Department of Commerce, Washington, D. C. 20230.

Microphotography

All documents entering the OTS collection as of July 15, 1964 will be available on microfiche (a unitized sheet form of microphotography) as well as full-size reproduction. The International Standards Organization size of 105 mm. x 148 mm. (approximately 4"x6") sheets of microfiche will be used. Image size will be generally an 18:1 reduction. If a document contains 57 pages or less, normally only one sheet of microfiche will be necessary. "Trailer sheets", or sheets in addition to the first for longer reports, will contain somewhat more pages.

OTS is changing its system because most Government agencies are converting to microfiche and because microfiche has the following advantages over microfilm:

Costs less to produce
Rapid production
Rapid dissemination
Simple to file
Fast Retrieval
Compact storage
Hard copy only when needed

Microfiche prices are included in the entries. Microfiche viewing and reproduction equipment is available from several U. S. and European companies.

Abstract Journals

The USGRR, beginning with the August 5 issue, contains listings and abstracts of only that material not listed and abstracted in other journals. There are four specialized journals abstracting documents available from OTS:

U. S. Government Research Reports -- Documents not listed in the other journals.
Technical Translations -- All translations.
Nuclear Science Abstracts -- AEC documents.
Scientific and Technical Aerospace Reports -- NASA documents.

Subscription prices for these publications are available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20204.

Improved Customer Service

In connection with the above developments, OTS is consolidating all its documentation operations, including printing and document storage and dissemination, in one building. All services to the customer should be greatly improved, including more prompt servicing of orders for documents.

NOTICE TO SUBSCRIBERS ABOUT RECENT OTS CHANGES

Recent developments aimed at strengthening and broadening the OTS program, under Public Law 776 - 81st. Congress, for the collection and distribution of Government research and development reports will result in some important changes directly affecting OTS customers. Changes just made include document prices and method of microphotography. In the future, changes in the price of literature searching and in the composition of the USGRR, and possibly other changes, will be made and announced.

An interagency agreement, announced by the White House on February 28, called upon the Department of Commerce to strengthen and broaden the functions of OTS under Public Law 776 to make the agency more effectively a "Clearinghouse for Federal Scientific and Technical Information."

Steps to develop such a Clearinghouse are being taken as rapidly as possible, and the Office of Technical Services has been extensively reorganized to effectively carry out the expanded functions.

The Clearinghouse provides a single point of contact through which current research efforts and the results of Government-sponsored research in science and technology can be made available to industry, commerce, and the general public. The Clearinghouse collects, organizes, publicizes, and provides reference, referral, and sales services for technical reports and translations received from domestic and foreign sources. The primary aim of the Clearinghouse is to achieve through interagency agreement and cooperation a unified documentation and distribution system for Government-generated technical reports and information on research in progress.

Another significant development, in line with the interagency agreement, was the signing on March 9 of an agreement between the Department of Commerce and the Department of Defense providing for OTS to handle all processing and distribution of unclassified/unlimited DOD reports, a function formerly performed largely by the Defense Documentation Center, except that OTS was responsible for announcement, reproduction, and sale of these documents to the public.

Prices

OTS has always been required by Public Law 776 to operate its reproduction and distribution program on a self-supporting basis. For some time, OTS has had one price for printed documents and another for documents reproduced by "blow-back" from microfilm. In order to establish a single pricing schedule, and one which will return costs of reproduction and handling, the agency has established a new price for all original or reproduced documents which on the average are 1/3 lower than the previous pricing schedule, as shown by the following table.

Price Comparison of New Standard Price with Present Dual Pricing Schedule

Pages	% Sales	Printed	Xerox	Average Present Price	New Standard Price
1 - 25	41.5	$ .50	$ 2.10	$ 1.30	$ 1.00
26 - 50	21.3	.75	4.60	2.68	2.00
51 - 100	16.5	1.50	8.60	5.05	3.00
101 - 150	7.0	2.50	11.00	6.75	4.00
151 - 200	5.5	3.00	13.50	8.25	5.00
201 - 300	4.8	3.50	18.50	11.00	6.00
301 - 400	1.2	5.00	21.00	13.00	7.00
401 - plus	2.2	6.00 plus	22.75 plus	14.38 plus	7.00 plus .01/page in excess of 400 pages

FEDERAL REGIONAL TECHNICAL REPORT CENTERS

Each of the Federal Regional Technical Report Centers listed below contains a collection of USAEC, NASA, and DOD unclassified reports as well as reports of other U. S. government agencies and provides reference, interlibrary loan, and reproduction services.

University of California
General Library
Berkeley, Calif. 94704

University of California
University Library
Los Angeles, Calif. 90024

Library of Congress
Science and Technology Division
Washington, D. C. 20540

Georgia Institute of Technology
Price Gilbert Library
Atlanta, Ga. 30300

The John Crerar Library
35 West 33rd St.
Chicago, Ill. 60616

Massachusetts Institute of Technology
M. I. T. Libraries
Cambridge, Mass. 02139

Linda Hall Library
5109 Cherry Street
Kansas City, Mo. 64100

Columbia University
Engineering Library
Seeley W. Mudd Building
New York, N. Y. 10027

Carnegie Library of Pittsburgh
4400 Forbes St.
Pittsburgh, Pa. 15213

Southern Methodist University
Science Library
P. O. Box 1339
Dallas, Tex. 75222

University of Colorado
Boulder, Colo. 80301

University of Washington Library
Government Documents Center
Seattle, Wash. 98105

CUMULATIVE INDEXES

The following Cumulative Indexes for U. S. Government Research Reports are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., 20402:

Volume 38	Annual Cumulative Index January - December 1963 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
	Cumulated Index May - December 1963 Includes Technical Abstract Bulletin only.	$3.50
	Collective Index 1 January - 1 May 1963 Includes Technical Abstract Bulletin only.	$3.50
Volume 37	Annual Cumulative Index January - December 1962 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
	Semi-annual Cumulative Index July - December 1962 Includes Technical Abstract Bulletin only.	$3.50
	Semi-annual Cumulative Index January - June 1962 Includes both Technical Abstract Bulletin (TAB) and "Non-Military and Older Military Reports" sections.	$3.50
Volume 36	July - December 1961	$3.50
Volume 35	January - June 1961	$1.00
Volume 34	July - December 1960	$1.00
Volume 33	January - June 1960	$1.00
Volume 32	July - December 1959	$1.00

For information regarding the availability of earlier indexes write to Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

TECHNICAL ABSTRACT BULLETIN

1. Aircraft and Flight Equipment

AD-603 527 Div. 1, 15, 30
OTS Prices: HC $7.00/MF $1.50

Hughes Aircraft Co., El Segundo, Calif.
NONLINEAR SHELL MATRIX ANALYSIS.
Rept. for 15 Jan-15 Dec 63,
by B. Klein, G. Kimura, S. Knisley, I. Stierle, and C. Wittkow. Feb 64, 316p SSD-31116R
Contract AF33 657 10192, Proj. 1467, Task 146701
RTD TDR63 4255

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Structural shells, Mathematical analysis), (*Matrix algebra, Programming (Computers)), Loading (Mechanics), Deflection, Bodies of revolution, Reinforcing materials, Pressure vessels, Numerical analysis, Integration, Series, Nonlinear systems.

A computer program is presented for solving a large class of complex nonlinear shell problems. The nonlinearities are due to large deflection effects. Initial imperfections are included in the formulation. The computer program consists of the following parts; input, diagnostic, matrix setup, and matrix solution. The matrix is set up by integrating the shell equations. The nonlinear terms are treated in a separate matrix. The solution is carried out in a step-by-step method. Examples are given to illustrate the methods and the computer program with recommendations given for increasing the capability of the latter. (Author)

AD-603 558 Div. 1
OTS Prices: HC $3.00/MF $0.75

Fenwal, Inc., Ashland, Mass.
SIMULATED FLIGHT TEST INVESTIGATION OF THE EFFECTIVENESS OF A LIGHTWEIGHT, AIRCRAFT, FIXED, FIRE-EXTINGUISHING SYSTEM.
Final rept.,
23 Jun 64, 71p
Contracts N600 19 59752, NOw61 0243c

Unclassified report

Descriptors: (*Fire extinguishers, Aircraft equipment), (*Aircraft fires, Fire extinguishers), Gas-generating systems, Jet engines, Aviation fuels, Simulation, Military requirements, Hydraulic fluids.

The lightweight, aircraft fixed, fire-extinguishing system met or exceeded the performance objectives of U. S. Navy, Bureau of Weapons Contract N600 (19) 59752 during fire tests conducted under simulated flight conditions. A test apparatus simulating the conditions in an aircraft tubine engine during flight was constructed. Fire tests were conducted using a conventional extinguishing system charged with Freon 1301. Duplicate tests were performed using the lightweight, fixed fire-extinguishing system and the results of these tests compared. (Author)

AD-603 596 Div. 1, 26
OTS Prices: HC $6.00/MF $1.25

United States Rubber Co., Wayne, N. J.
PRODUCT IMPROVEMENT PROGRAM TO PROVIDE EXTRA HIGH STRENGTH PURCHASE TAPES FOR THE BAK-9/F48A AIRCRAFT ARRESTING BARRIER.
Final rept.,
by Daniel Schichman and S. C. Illingworth. Jun 64, 262p
Contract AF33 657 9653, Proj. 912A0000 97105
SEG TDR64 23

Unclassified report

Descriptors: (*Arresting gear, Tapes), (*Tapes, Arresting gear), Aircraft, Landing aids, Cordage, Dacron, Nylon, Mechanical properties, Manufacturing methods, Quality control, Test methods, Mathematical models, Analog computers.

This report was prepared in order to present the results of an analytical and experimental effort to provide extra high strength purchase tapes with improved wear and engaging speed characteristics for the BAK-9 arresting system. The purchase tapes now used on the BAK-9 barrier have an ultimate strength of 70,000 pounds and are not capable of exploiting the full thermal energy potential of the absorber unit. Using the existing purchase tapes, the BAK-9 has a nominal energy capacity of 52 million foot-pounds in 950 feet of runout with this capacity being limited by maximum permissable tape tension. It is considered that full thermal capacity of the BAK-9 (70 million foot-pounds) can be realized by using purchase tapes having an ultimate strength of 100,000 pounds while still retaining the same physical dimensions as the existing tapes. A design study covering the materials and construction of the present tape was made. The quality control methods employed by the tape manufacturer were investigated and evaluated. An analog computer study of the behavior of the tape during an arrestment and the control parameters which describe the operation of the BAK-9 system was made. Finally, a tape design which is considered to fulfill the requirements of the contract is recommended. (Author)

AD-603 700 Div. 1
OTS Prices: HC $1.00/MF $0.50

Systems Engineering Group, Research and Technology Div., Wright-Patterson AFB, Ohio.
COMPROMISES ESSENTIAL TO SELECTION OF AN AIRCRAFT TIRE TREAD DESIGN,
by W. M. Roberts. Jun 64, 18p
Proj. 931H 97068
SEG TDR64 22

Unclassified report

Descriptors: (*Aircraft tires, Design), (*Friction, Aircraft tires), Deceleration, Aircraft, Costs, Performance (Engineering), Landing.

This paper presents a study of the contribution of tire tread in stopping aircraft on wet runways and a determination of optimum design for the best braking coefficient, considering the effects of wear and cost. The study is based on KC-135 and Boeing 707 type aircraft tires operating in water to a depth of 0.05 to 0.30 inches. The investigation shows that new tires meet the stopping distance

performed with air flows of 2500, 6000, and 9500 cubic feet per minute; engine skin temperatures of 200 and 550 degrees Fahrenheit and weights of Freon 13B1 (extinguishing agent) of 8, 3.7, 2.5, and 1 pounds.

AD-603 749 Div. 1
OTS Prices: HC $5.00/MF $1.00

Bendix Products Aerospace Div., Bendix Corp., South Bend, Ind.
BAND-PASS SHOCK ABSORBER STUDIES,
Apr 64, 159p SH-64-1
Contract NOw60 0373C
Unclassified report

We regret that legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Vibration isolators, Landing impact), (*Landing gear, Vibration isolators), Arresting gear, Loading (Mechanics), Shock (Mechanics), Fighters, Attack bombers, Fluid dynamic properties, Analog computers, Mathematical models.

The principal objective of the program was to study the application of the band-pass principle to aircraft landing gear shock struts. The program included both theoretical and experimental evaluation. The first portion of the theoretical studies was devoted to the design and evaluation of a band-pass unit for the McDonnell F4H-1 MLG shock strut. The second part of the theoretical studies was the design and evaluation of a unit for the North American A3J-1 MLG shock strut. The experimental program consisted of the fabrication of a band-pass unit and modification of the A3J-1 shock strut to utilize it and the test program conducted in the drop test tower over the 120 inch dynamometer. The principal result or conclusion coming from the program is that loads arising from arresting cable impact, into the unsprung mass (tire, wheel, axle, and inner cylinder of shock strut) are not alleviated to any appreciable degree through use of the band-pass principle. The incremental increases in loads through the landing gear attach points into the aircraft structure, however, may be reduced up to 50%. (Author)

AD-603 758 Div. 1, 17
OTS Prices: HC $4.00/MF $1.00

Douglas Aircraft Co., Inc., Long Beach, Calif.
LABORATORY AND FLIGHT EVALUATION OF AIRCRAFT AIRCOOLED WHEEL BRAKES WITH BERYLLIUM HEAT SINK.
20 Dec 63, 132p LB-31550
Contract NOw62 0297t
Unclassified report

Descriptors: (*Brakes, Aircraft), (*Aircraft, Vehicle brakes), (*Heat exchangers, Beryllium), (*Beryllium, Vehicle brakes), Flight testing, Brakes, Environmental tests, Design, Costs, Naval aircraft, Taxiing, Wear resistance, Instrumentation, Temperature, Time, Materials, Blowers, Tables, Heat transfer, Ducts, Air cooled.

A program for the evaluation of forced aircooled beryllium heat sink aircraft wheel brakes installed on an A-3 aircraft was established. Laboratory and aircraft field tests showed the braking system to be feasible and practicable. The aircooling reduced aircraft turn-around time by 65 percent and the beryllim heat sink provided 19 percent weight saving. Design and cost parameters are established and consideration for use of a beryllium heat sink brake is recommended for use on future aircraft. (Author)

AD-603 791 Div. 1, 9, 30
OTS Prices: HC $4.00/MF $0.75

Princeton Univ., N. J.
TESTS OF A HAMILTON STANDARD FOUR-WAY, 21-INCH-DIAMETER MODEL PROPELLER EMPLOYING THE U. S. NAVY AIRBORNE MODEL TEST FACILITY.
Rept. for 23-31 Aug 62,
by John W. Olcott. Apr 64, 123p AER-675
Contract Nonr1858 14; Grant NSF GP579, Proj. NR212 000
Unclassified report

Descriptors: (*Propellers (Aerial), Model tests), (*Propeller blades, Aerodynamic loading), Test facilities, Airborne, Moments, Stresses, Force (Mechanics), Vibration, Thrust, Structural properties, Transport planes, Vertical take-off planes.

The U. S. Navy's Airborne Model Test Facility was employed to obtain aerodynamic and structural test data for a Hamilton Standard 1/9th-scale model representative of an early propeller design for the XC-142 aircraft. All propeller forces and moments plus propeller blade stresses are presented for inflow angles through 90 degrees. (Author)

AD-603 835 Div. 1, 9
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TRANSTABILITY FLUTTER OF SUPERSONIC AIRCRAFT PANELS,
by R. P. Isaacs. 1 Jul 49, 15p P-101
Unclassified report

Descriptors: (*Airplane panels, Aerodynamic loading), (*Flutter, Airplane panels), Aeroelasticity, Stability, Beams (Structural), Buckling (Mechanics), Supersonic flow, Supersonic planes, Models (Simulations).

A beam is clamped at the ends. The ends have been forced toward one another before clamping so that the beam is buckled slightly. One face of the beam is exposed to a supersonic air stream flowing parallel to the beam whose effect is a pressure negatively proportional to the inclination of the beam. The practical prototype of this model which was used to study transtability flutter is a panel in the structure of a supersonic aircraft.

AD-603 863 Div. 1, 28
OTS Prices: HC $3.00/MF $0.75

National Aviation Facilities Experimental Center, Atlantic City, N. J.
SIMULATOR COMPARISON OF NETHERLANDS LANDING ZONE LIGHTING PATTERNS.
Final rept.,
by Robert K. McKelvey, Guy S. Brown, and Robert J. Ontiveros. Feb 64, 84p
Contract ARDS472, Proj. 421 29R
FAA RD 64 25
Unclassified report

Project was assisted by the Netherlands Aero and Astronautical Research Institute, Amsterdam for whom the rept. was prepared.

Descriptors: (*Netherlands, Terminal flight facilities), (*Terminal flight facilities, Approach lights), (*Lighting equipment, Runways), Simulation, All-weather aviation, Landing aids, Flight simulators, Visibility, Configuration, Performance (Human), Instrument landings, Analysis of variance, Tables, Pilots.

As a part of an exchange of equipment and services in airport lighting research programs, the Systems

requirements regardless of tread design. Tires 80 to 90% worn, however, require a minimum of four grooves to stop within the desired distance. Therefore, wear effect must be considered in establishing tread design requirements. Significant improvement in stopping distance is not obtained with designs having more than five grooves; an increase from five to nine grooves provides a 10% reduction in stopping distance, and more than nine grooves provides little additional reduction. A study of cost indicates that to obtain a 10% reduction in stopping distance by increasing the number of grooves from five to nine increases operating cost by 64%. For KC-135 applications, this increase in cost is relatively high for a modest improvement in performance. However, each aircraft should be considered in light of its own performance requirements. Cost should not become a deterrent in meeting the required performance of exceptionally high speed or STOL aircraft. (Author)

AD-603 703 Div. 1
OTS Prices: HC $2.00/MF $0.50

Systems Engineering Group, Research and Technology Div., Wright-Patterson AFB, Ohio.
X-20 (DYNA-SOAR) LANDING GEAR DEVELOPMENT AND QUALIFICATION PROGRAM,
by H. W. Howard. Jun 64, 41p
SEG TDR64 17

Unclassified report

Summary of work accomplished by The Boeing Co. under Contract AF33 657 7132, by the Air Force Missile Development Center, and by the Air Force Flight Test Center.

Descriptors: (*Aerospace planes, Landing gear), (*Landing gear, Aerospace planes), Skis, Metal plates, Nickel alloys, Wear resistance, Landing impact, Energy, Absorption, Test methods, Tests, Performance (Engineering).

A description of the X-20 landing gear and performance requirements are presented. The yielding metal energy absorption system and the all skid concept is discussed. A summary is presented of the 'energy strap' and skid development programs. The qualification program, which had not been initiated at the time of program termination, is discussed, and conclusions and recommendations are presented. (Author)

AD-603 704 Div. 1
OTS Prices: HC $2.00/MF $0.50

Systems Engineering Group, Research and Technology Div., Wright-Patterson AFB, Ohio.
THE X-20 FLIGHT CONTROL SYSTEM DEVELOPMENT,
by Edward H. McDonald and Joseph A. Farris.
Jun 64, 36p
SEG TDR64 8

Unclassified report

Outline summary of features developed by The Boeing Co. and the Minneapolis-Honeywell Regulator Co. under Contract AF33 657 7132.

Descriptors: (*Aerospace planes, Flight control systems), (*Flight control systems, Aerospace planes), (*Spacecraft, Flight control systems), Adaptive control systems, Redundant components, Design, Operation.

This report attempts to provide continuity and rationale to the development of the Flight Control System for the X-20 (Dyna-Soar) Vehicle. The unique features are noted and the documents providing details of these features are referenced. The more significant problems encountered in the development are discussed together with the solution or the approaches being taken to obtain a solution. (Author)

AD-603 744 Div. 1, 28
OTS Prices: HC $3.00/MF $0.75

Bell Helicopter Co., Fort Worth, Tex.
CONTACT ANALOG SIMULATOR EVALUATIONS: CLIMBOUT, LOW CRUISE AND DESCENT MANEUVERS.
Technical rept.,
by J. H. Emery and D. J. Dougherty. May 64, 62p
D228-421-017
Contract Nonr1670 00

Unclassified report

Rept. on (JANAIR) Joint Army-Navy Aircraft Instrumentation Research.

Descriptors: (*Flight simulators, Helicopters), (*Display systems, Flight instruments), (*Human engineering, Flight simulators), Vertical indicators, Climbing, Level flight, Approach, Experimental data, Analysis of variance.

The study was designed to evaluate the contact analog vertical display which is an electronically generated encoded representation of the real world capable of presenting sensed information for altitude, airspeed, heading, pitch and roll. Encoded ground position and flight path symbols are also capable of being generated. Pilot subjects performed simulated helicopter flight maneuvers which included lift-off, climbout, cruise and approach. The study was conducted in the Bell Helicopter Company dynamic helicopter simulator. The task was performed on different conditions of display content, glideslope angle and heading. Measures of performance included absolute integrated error of climb and approach airspeed, glideslope angle deviation, maximum vertical deviation from glideslope, fore/aft and lateral position error at hover, and vertical speed and altitude at hover. Analyses of the results are presented and discussed. Recommendations for display content for similar maneuvers in the research helicopter (RH-2) are presented. (Author)

AD-603 746 Div. 1, 30
OTS Prices: HC $1.00/MF $0.50

Fenwal, Inc., Ashland, Mass.
EVALUATION OF LIGHTWEIGHT FIRE EXTINGUISHING SYSTEM UNDER SIMULATED FLIGHT CONDITIONS.
Interim rept. no. 6, 3 Feb-2 Apr 64,
by C. J. Cole. 2 Apr 64, 5p
Contract N600 19 59752

Unclassified report

Descriptors: (*Aircraft fires, Fire extinguishers), (*Fire extinguishers, Aircraft equipment), Jet engine fuels, Ignition, Jet engines, Simulation, Fuel sprays, Gas generating systems, Fire alarm systems, Aviation fuels.

A total of one hundred and thirty tests were performed to date, and data were obtained which contribute to the evaluation of a lightweight fire extinguishing system under simulated flight conditions. Design work during this period consisted only of adapting surveillance and continuous fire detection systems to the simulated jet engine used in these tests. Testing during this period consisted of extinguishing fires created in the simulated jet engine with both conventional and lightweight extinguishing systems. The fires were created by igniting a six-gallon-per-minute spray of JP-4 jet engine fuel within the simulated jet engine. Tests were

AD-603 960 Div. 1, 14, 26
OTS Prices: HC $5.00/MF $1.00

Shell Development Co., Emeryville, Calif.
STUDY OF HELICOPTER GEAR LUBRICATION.
Final rept. for 1 Jun 63-31 May 64,
by S. J. Beaubien, L. Lichtman, C. A. Converse, and R. L. Jensen. 31 May 64, 168p Shell-S-13926
Contract NOw63 0557c

Unclassified report

Descriptors: (*Lubrication, Transmission gears), (*Gears, Helicopters), (*Helicopters, Transmission gears), Transmissions, Failure (Mechanics), Load distribution, Stresses, Lubricants, Fatigue (Mechanics), Design, Wear resistance, Surface properties, Environmental tests, Experimental data, Simulation.

This study of helicopter gear lubrication consists in a study of the types of failure that have occurred in helicopter transmissions in the field, and an attempt to learn the causes of such failures on a theoretical and experimental basis. The overall objectives of the work, however, are not limited to solutions of gear lubrication problems of existing helicopter transmissions, but also aim at developing information useful to future transmission designs and, in part, applicable to other gear systems.

AD-604 026 Div. 1
OTS Prices: HC $2.00/MF $0.50

Aviation Safety Engineering and Research, Phoenix, Ariz.
STRUCTURAL ANALYSIS OF THREE CRASH IMPACT CONFIGURATIONS IN STEEL TUBE AND FABRIC AIRCRAFT.
Preliminary rept.
by James P. Avery and Ruth M. Petry. May 64, 48p
AvSER-63-9
Contract DA44 177AMC888T, Task 1A024701A12101, formerly Task 9R95 20 001 01
TRECOM TR64 5

Unclassified report

Descriptors: (*Airframes, Impact shock), (*Aviation accidents, Impact shock), Landing impact, Mathematical models, Airspeed, Deceleration, Airplane noses, Wings, Landing gear, Aircraft cabins, Aviation safety, Structures, Mathematical analysis.

This report covers the development of limited mathematical models to predict in qualitative terms the crashworthiness of a light airframe structure (of the Piper J-3 type) under three impact conditions. Two indices of crashworthiness were selected: (1) the aircraft velocity required to cause structural collapse short of general cabin collapse, and (2) the maximum deceleration applied to the occupants during the crash. Engineering analysis and physical principles are applied to each appropriate mathematical model to develop the crashworthiness indices. Sample calculations were made for the Piper J-3 in three typical crash impact configurations: nose impact, nose and wing impact, and impact on the landing gear (considering only the vertical velocity component). The preliminary study reveals that the crashworthiness indices selected are potentially useful in evaluating structural modifications such as the eight items discussed. (Author)

AD-604 030 Div. 1, 27
OTS Prices: HC $7.00/MF $1.50

Lockheed-California Co., Burbank.
INVESTIGATION OF ELASTIC COUPLING PHENOMENA OF HIGH SPEED RIGID ROTOR SYSTEMS.
Rept. for Apr 62-Jun 63,
by John E. Yeates. Jun 64, 307p Lock-LR-17013
Contract DA44 177tc828, Task 1D121401A14302
TRECOM TR63 75

Unclassified report

Descriptors: (*Helicopter rotors, Design), (*Rotor blades (Rotary wings), Design), Blade airfoils, Dynamics, Oscillation, Stability, Aerodynamic loading, Hovering, Couplings, Elasticity, Wind tunnel models, Control systems.

The report describes an investigation of the effects of variations in design parameters on the dynamic characteristics of cantilever blade or 'rigid' rotors. Some fundamental concepts of rigid rotor dynamics including decoupling are presented, as well as a 10-degree-of-freedom rotor stability analysis in hovering and a brief study of the static stability of the model. A dynamic helicopter wind tunnel model having a 10-foot rotor diameter was constructed with three sets of blades and a hub which allowed many variations in geometry and stiffness. Seven rotor configurations were tested. The model and rotors and the testing technique are described, and all the data collected are included. A principal focus of the program was the decoupled, or 'matched blade', type of rigid rotor. It was demonstrated to simulated air speeds on the order of 240 miles per hour that this type of rotor is stable with extremely small values of control gyro inertia. In addition, it was found that blade matching has a major influence on chordwise oscillating blade loads. (Author)

AD-604 065 Div. 1
OTS Prices: HC $7.00/MF $1.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ANALYSIS OF CONTROL-DISPLAY LIMITATIONS IN MULTI-JET TRANSPORT AIRCRAFT.
Master's thesis,
by James P. Eri and Paul E. Blatt. Jun 64, 388p
AFIT GGC/EE/64-4

Unclassified report

The original document contains color, but distribution copies are available in black-and-white reproduction only.

Descriptors: (*Jet transport planes, Instrument panels), (*Instrument panels, Jet transport planes), Flight instruments, Flight control systems, Automatic, Digital computers, Analog computers, Display systems, Analysis, Equations, Design, Control panels.

A survey of operational problems encountered in both commercial and military multi-jet transport aircraft has revealed a number of control-display limitations which restrict aircraft usefulness and effectiveness. This study was instigated to thoroughly analyze existing problems and to recommend corrective action applicable to present and future multi-jet transports. A long range mission was investigated in detail by analytical techniques, leading to a logical progression of sensors, computers, displays and controls required for the vehicle. Results of this study will serve as the basis for continuing refinement of the multi-jet transport control-display subsystem. Of even greater importance is the application of the systematic design approach to a proposed aircraft, thus setting a precedent and an example for control-display design of succeeding vehicles.

AD-604 066 Div. 1
OTS Prices: HC $7.00/MF $1.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
APPLICATION OF LIMIT-CYCLE AND PARAMETER-

Research and Development Service, of the Federal Aviation Agency, has conducted a comparison of touchdown zone lighting configurations of interest to the Netherlands Government. The experiment was conducted in a flight simulator with a visual landing attachment. Systems compared differed primarily in the use of aiming point identifiers and longitudinal vs. lateral arrays in the landing zone. The results confirm the role of the aiming point identifier in controlling precision of longitudinal positioning at touchdown, but warn against possible ambiguity of information if sufficiently distinctive pattern characteristics are not used to distinguish between successive elements of the approach and landing zone systems. Other findings of interest are reviewed in the report. (Author)

AD-603 869 Div. 1, 30
OTS Prices: HC $3.00/MF $0.75

Eclipse-Pioneer Div., Bendix Corp., Teterboro, N. J.
ANALOG COMPUTER STUDY OF SAFE LOW APPROACH DECISION REGIONS AND EFFECTIVENESS OF GLIDE PATH EXTENSION TECHNIQUES.
Final rept., Phase 3,
by A. Friedman and J. Doniger. 31 Mar 64, 72p
Contract ARDS451, Projs. 114 1312D, AD1091
Unclassified report

Descriptors: (*Aircraft landings, All-weather aviation), (*Instrument landings, Glide path systems), (*Glide path systems, Instrument landings), Programming (Computers), Radio beams, Approach, Ground-controlled approach radar, Radar landing control, Simulation, Operations research.

This report presents the results of analog computer studies of the following three aspects of ILS - based all-weather landing systems; a. determination of minimum manual go-around altitudes under various conditions of winds and available thrust. b. determination of the range of initial aircraft positions and velocities from which a pilot can make a safe landing after completing a low approach. c. evaluation of four glide slope extension techniques to discover if the employment of these techniques permits a relaxation of the tolerable course path bend amplitudes of the ILS signals as determined in phase I of this study. These studies were performed for the Boeing 707/320B and Caravelle series 10-R aircraft. (Author)

AD-603 904 Div. 1, 9
OTS Prices: HC $3.00/MF $0.75

Princeton Univ., N. J.
A WIND-TUNNEL INVESTIGATION OF THE EFFECTS OF LEADING-EDGE BLOWING JETS UPON THE LIFT, DRAG, AND PITCHING MOMENT OF A 76 DEGREE DELTA WING,
by Chester J. Gabriel. Jul 64, 95p AER-697
Contract Nonr1858 14; Grant NSF GP579,
Proj. NR212 000
Unclassified report

Descriptors: (*Delta wings, Fluid dynamic properties), (*Wing inlets, Jets), (*Jets, Delta wings), Boundary layer control, Leading edge flaps, Pitch (Motion), Drag, Lift, Angle of attack, Thrust, Jet flaps, Blowers, Jet planes, Wind tunnels, Airplane models, Stability.

A wind tunnel investigation was made of the effects of leading edge blowing jets, in the plane of the planform and directed away from the wing, upon the lift, drag, and pitching moment of a 76 degree delta wing of aspect ratio one. A theory for the lift of a flat plate delta is presented and compared with the experimental data. It was found that jet outlet velocity/free-stream velocity is a better parameter than momentum coefficient for the analysis of lift data with the type of blowing jet configuration used. Lift coefficient increased appreciably with blowing at low values of the parameters, and then tended to level off as blowing was increased. At low angles of attack, the only additional drag induced by blowing was the momentum drag due to the rearward thrust of the jets. It was found that such blowing reduced the stability of the wing. (Author)

AD-603 931 Div. 1, 28
OTS Prices: HC $1.00/MF $0.50

Civil Aeromedical Research Inst., Oklahoma City, Okla.
HUMAN FACTORS ASPECTS OF LIGHTPLANE SAFETY,
by Richard G. Pearson. Dec 63, 12p
CARI 63 35
Unclassified report

Descriptors: (*Aviation safety, Human engineering), Aviation accidents, Aviation injuries, Aviation medicine, Civil aviation, Aircraft, Design, Statistical analysis, Pilots.

This paper attempts to relate aircraft accident investigation and aeromedical research efforts for the purpose of clarifying research needs. Such efforts ultimately can lead to a reduction in lightplane accidents, injuries, and fatalities. Recent statistical studies of lightplane crash injuries are summarized, and contributions that human biologists, physical anthropologists, and design engineers can make toward reducing or preventing injury in future crashes are discussed. Programs of biomedical and human engineering research as they relate to lightplane safety are described. Contributions that physicians can make to this program are outlined. (Author)

AD-603 958 Div. 1
OTS Prices: HC $5.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A PARTIALLY COMPLETED FIXED-GAIN LATERAL-AUGMENTATION SYSTEM FOR THE B-58 AIRCRAFT.
Master's thesis,
by Earl L. Stroud. May 64, 195p
AFIT GGC/EE/64 17
Unclassified report

Descriptors: (*Flight control systems, Design), Aerial rudders, Ailerons, Stabilization systems, Accelerons, Stabilization systems, Accelerometers, Damping, Roll, Yaw.

A discussion is given of the design of a fixed-gain lateral augmentation system for the B-58. While the design is only partially completed, there is considerable evidence to indicate that it will be satisfactory over the flight envelope of the B-58 aircraft. The lateral-system general transfer functions were developed for an aileron-rudder interconnect ratio (ARI) equal to minus one, the effect of high-gain in the acceleration loop was qualitatively determined, and the function of the yaw-rate loop was established. A basic concept used in the design of the system was that the problem of pilot coupling during an engine failure will progressively decrease as the damping ratio of the system increases. The prime weakness of the design is the small amount of rudder deflection that the acceleration loop causes, and is due to the design concentrating on damping of the Dutch-Roll frequencies; consequently, during a pulsed aileron input, the system is too slow to reduce lateral accelerations caused by an incorrect ARI ratio which is apparent in four of the six flight conditions tested.

2. Astronomy, Geophysics and Geography

AD-603 535 Div. 2, 7
OTS Prices: HC $7.00/MF $1.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
GLAZED FROST AND ICE FORMATION ON CABLES WITHIN THE TERRITORY OF THE USSR,
by A. V. Rudneva. 28 Jul 64, 314p
ATD U64 47; TT 64 71204

Unclassified report

Unedited rough draft trans. of mono. Gololed i Obledenenie Provodov na Territorii SSSR, Leningrad, 1961, 174p.

Descriptors: (*Ice, Cables), (*Cables, Ice), Electric cables, Snow, Hydrology, Climatology, Geography, Thickness, USSR.

The monograph contains the results of studies made on ice rime phenomena, a description of the ice formation conditions within the territory of the USSR, and is the first scientific summary of accumulated data taken from instrumental observations made of ice formation on cables. The information contained in the monograph can be used in designing and operating communication and electric power lines and other line installations. The monograph is also of interest for meteorologists, climatologists, geographers, and other readers interested in problems of climate within the USSR. (Author)

AD-603 570 Div. 2
OTS Prices: HC $3.00/MF $0.75

Stanford Research Inst., Menlo Park, Calif.
CLEAR-AIR TURBULENCE AND ITS ANALYSIS BY USE OF RAWINSONDE DATA.
Final rept.,
by R. M. Endlich and R. L. Mancuso. Jun 64, 65p
Contract Cwb10624

Unclassified report

Descriptors: (*Turbulence, Atmospheric motion), (*Atmospheric motion, Turbulence), Terrain, Jet streams (Meteorology), Wind, Fluid dynamic problems, Measurement, Radiosondes, Flight paths, Jet planes, Meteorological charts.

This investigation of clear-air turbulence has several parts. The first section reviews selected aspects of turbulence, and emphasizes the large size and persistent nature of certain areas of moderate or severe turbulence. The next section is an investigation of turbulence in pronounced jet stream flow over mountains. In order to test the utility of standard upper-air data in turbulence analysis, values of Richardson's number and the turbulence index were determined by electronic computer in eight layers between 500 and 150 mb at all rawinsonde stations in the United States during the period 12-24 March 1962. These values are compared with turbulence reports made by pilots of jet aircraft and collected by the Clear-Air Turbulence Project. Several maps are presented that illustrate substantial agreement of computed quantities with the turbulence reports. Standard statistical tests show that both the Ri and TI numbers have definite skill in turbulence analysis, and that combined use of the two numbers is more accurate than use of either one separately. Suggestions are given for further improvement of criteria for analyzing turbulence. Experiments in grid-point analysis of turbulence and in objective turbulence forecasting are recommended. (Author)

AD-603 571 Div. 2, 15
OTS Prices: HC $2.00/MF $0.50

California Univ., Los Angeles.
INVERSION OF THE OMEGA-EQUATION.
Final rept.,
by T. N. Krishnamurti. Apr 64, 50p
Grant WB11

Unclassified report

Prepared in cooperation with Buenos Aires Univ. (Argentina).

Descriptors: (*Weather forecasting, Numerical methods and procedures), (*Numerical methods and procedures, Weather forecasting), Meteorological parameters, Mathematical models, Equations, Meteorological satellites, Data, Numerical analysis, Meteorological charts.

A formal method of inversion of the baroclinic Omega-equation of the quasigeostrophic models is proposed. An application to satellite meteorology is suggested, where a 500 millibar surface is obtained in regions of sparse data from a knowledge of the surface map and the vertical motion field. (Author)

AD-603 574 Div. 2, 24
OTS Prices: HC $2.00/MF $0.50

Chicago Univ., Ill.
EVALUATION OF ERRORS IN THE GRAPHICAL RECTIFICATION OF SATELLITE PHOTOGRAPHS.
Satellite and Mesometeorology Research Proj. research paper,
by Tetsuya Fujita. Jul 64, 26p SMRP-RP-30
Grant CWB WBG6

Unclassified report

Descriptors: (*Rectifiers (Photography), Graphics), (*Meteorological satellites, Photography), (*Photographs, Cloud cover), Satellites (Artificial), Pictures, Meteorological parameters, Position finding, Errors, Analysis.

In order to investigate the proper design of the grid systems used in gridding or rectifying satellite pictures, an evaluation of errors from various sources has been made. It was found that the discrete grid intervals of both height and tilt are of vital importance in determining final accuracy. The rotation of the grid around the exposure subpoint is found to be permissible unless an accuracy of 0.1 degree is required. Where accuracy requirements permit, the author's OEC height grids may be replaced by ZE height grids which are less complicated and much easier to use. This change also permits the use of perspective height and tilt grids with less than 0.2 degree error. An evaluation of the gridding error due to the uncertainty of the spin-axis points revealed that it may be almost entirely eliminated by adopting a coupled rotation of the principal lines. (Author)

AD-603 592 Div. 2, 27, 30
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
A PRELIMINARY EVALUATION OF THE CRICKETSONDE ROCKET SYSTEM.
Instrumentation paper,
by Konstantins Pocs. Jun 64, 23p
Proj. 6682, Task 668205
AFCRL 64 469; AFCRL IP43

Unclassified report

Descriptors: (*Sounding rockets, Meteorology), (*Atmospheric sounding, Rockets), Radiosondes, Low altitude, Telemeter systems, Parachute descents,

PERTURBATION ADAPTIVE TECHNIQUES TO CONTROL OF THE FLEXIBLE SUPERSONIC TRANSPORT.
Master's thesis,
by Nicholas C. Belmonte and Rance S. Edmunds.
May 64, 350p
AFIT GGC/EE/64 3

Unclassified report

Descriptors: (*Adaptive control systems, Design), Flight control systems, Supersonic planes, Transport planes, Simulation, Elasticity, Feasibility studies, Perturbation theory, Functions, Frequency, Acceleration.

The parameter-perturbation study stresses the design of a suitable gain changer, while the limit-cycle study stresses controller design. Areas of investigation include: the effects of elasticity and sensor blending techniques; the design of a low-frequency limit-cycle system; a parameter-perturbation adaptive control system; and a normal-acceleration control system.

AD-604 253 Div. 1, 19
OTS Prices: HC $6.00/MF $1.25

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio
APPLICATION OF THE LIMIT-CYCLE SELF-ADAPTIVE CONCEPT TO THE B-58 LATERAL DIRECTIONAL STABILITY AUGMENTATION SYSTEM.
Master's thesis,
by Boris E. Bright and John D. Ellington. May 64, 206p
AFIT GGC/EE/64 5

Unclassified report

Descriptors: (*Flight control systems, Jet bombers), (*Adaptive control systems, Jet bombers), (*Jet bombers, Adaptive control systems), Automatic pilots, Stabilization systems, Feasibility studies, Ailerons, Aerial rudders, Roll, Damping.

The limit-cycle concept is used to design a lateral-directional control system for the B-58. Existing servos and sensors are used, and the mechanical aileron-to-rudder interconnect is maintained. An analog simulation is used to evaluate the feasibility of the concept as applied to the B-58. The design is evaluated for roll-damper failure, coordination, wing heaviness, and engine failure. The evaluation shows that the concept will usually result in a system with good lateral stability but low Dutch roll damping. The low damping can cause serious pilot coupling. Some possible corrective measures are indicated. (Author)

AD-604 307 Div. 1, 17, 26
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
A METHOD FOR DETERMINING THE EFFECTS OF ELEVATED TEMPERATURE ON STRUCTURAL DESIGN AND WEIGHT,
by W. R. Micks. Mar 54, 74p P-498

Unclassified report

Descriptors: (*Aircraft, Design), (*Structural parts, Aircraft), (*Strain (Mechanics), Aircraft), High-temperature research, Stresses, Creep, Buckling (Mechanics), Deformation, Mechanical properties, Loading (Mechanics), Weight, Failure (Mechanics), Compressive properties, Aluminum alloys, Steel, Elasticity, Flight speeds, Time.

A method of including temperature and time effects in the determination of allowable stresses for structures that operate at elevated temperatures is presented. Creep-buckling and permanent structural deformation are considered, as well as the static, or short-time properties of the material at elevated temperature. Results are obtained in a form that can be used for preliminary-design weight estimation. Recommendations are made regarding research needed to form a basis for structural design at elevated temperatures. (Author)

Descriptors: (*Cloud cover, Ultraviolet radiation), (*Ultraviolet radiation, Cloud cover), Ultraviolet spectroscopy, Solar radiation, Spectrum analyzers, Spectrophotometers, Meteorological parameters, Clouds, Climatology, Sky brightness, Albedo (Astronomy), Scattering, Ozone, Intensity, Diurnal variations, Measurements, Statistical analysis, Tables, Switzerland.

The spectral intensity of ultraviolet radiation from the cloudless and the cloudy sky at Davos (Swiss Alps, 1590 m a.s.l.) has been measured for lambda=330 millimicrons and 370 millimicrons. No effect of atmospheric ozone on the intensity must be taken into account at these wavelengths. The ratio q between the intensity obtained with and without clouds is applied in this investigation as a measure for the influence of the clouds on ultraviolet sky radiation; the values of the ratio q have been plotted as a function of solar altitude for various cloud conditions. Mean values $\bar{q}$ of the ratio q averaged over the whole interval of solar altitude have been determined for different kinds and amounts of cloud and the mean scatter R of the values q has been computed for each cloud condition considered. (Author)

AD-603 727 Div. 2
OTS Prices: HC $1.00/MF $0.50

Kiruna Geophysical Observatory (Sweden).
A SYSTEM FOR AUTOMATIC COLLECTION OF GEOMAGNETIC DATA IN DIGITAL FORM.
Annual summary rept. for 1 Dec 62-31 Jan 64,
by G. Gustafsson, F. Eleman, and K. E. Heikkila.
24 Mar 64, 23p
Contract AF61 052 237
AFCRL 64 470

Unclassified report

Descriptors: (*Digital recording systems, Terrestrial magnetism), (*Terrestrial magnetism, Digital recording systems), Sweden, Automation, Magnetic fields, Instrumentation.

Equipment was constructed for automatic collection of geomagnetic data in digital form. It samples all three components of the earth's magnetic field each 30 seconds. The instrumentation was tested for recording of one component for a year and found to be working satisfactorily. It is now being tested for three components. (Author)

AD-603 729 Div. 2, 9
OTS Prices: HC $2.00/MF $0.50

Technische Hochschule, Darmstadt (West Germany).
ON THE TWO-DIMENSIONAL SPECTRAL ANALYSIS OF KINETIC ENERGY OVER A CIRCUMPOLAR AREA OF A SPHERE.
Technical note no. 5,
by F. Mesinger. 31 Dec 63, 48p
Contract AF61 052 366
AFCRL 64 248

Unclassified report

Descriptors: (*Wind, Atmospheric motion), (*Turbulence, Atmospheric motion), Kinetic theory, One-dimensional flow, Two dimensional flow, Spectroscopy, Polar regions, Air, West Germany.

Two possibilities for the two-dimensional spectral analysis of kinetic energy of flow-fields (on spherical earth) are discussed: one using the associated Legendre polynomials for meridional representation, and the other the sin functions with a latitude-dependent amplitude factor. The latter method is applied to the analysis of some 500 mb observed and barotropically predicted wind fields. The obtained two-dimensional and resulting one-dimensional spectral distributions are described. A fair similarity is observed between the meridional spectra of zonal motion and zonal spectra of meridional motion, and between the meridional spectra of meridional motion and zonal spectra of zonal motion. Differences in time variations of observed and predicted spectra are treated: predicted spectra showed considerably smaller time variability. Data on the influence of the viscosity term on the spectra are presented. (Author)

AD-603 772 Div. 2, 8
OTS Prices: HC $3.00/MF $0.75

Army Signal Radio Propagation Agency, Fort Monmouth, N. J.
GREAT-CIRCLE AND DEVIATED-PATH OBSERVATIONS ON CW SIGNALS USING A SIMPLE TECHNIQUE,
by Frederic H. Dickson and Richard Silberstein.
May 64, 88p
Projs. 872, 6 5D

Unclassified report

Rept. on Proj. Fishbowl.

Descriptors: (*Radio waves, Propagation), (*Ionospheric propagation, Radio waves), Radio transmission, Radio transmitters, Scattering, High frequency, Antennas, Azimuth, Pacific Ocean, Signals.

A modification of the Pinwheel techniques of observing HF signals propagated over deviated paths was used over Pacific paths on 12, 18 and 30 Mc. Strip-chart records made of CW signals with directive receiving antennas rotating ten times as fast as similiar transmitting antennas gave distinct records of deviated scatter signals alone or co-existing with great-circle signals. By the use of precise program timers, combined receiving and transmitting azimuths for strongest signals were obtained. Although scattering from land masses or from equatorial 'spread-echo' layers seemed a possibility when scatter signals came from a relatively fixed location, most of the results examined indicated, for all frequencies, variable scattering locations on the sea, determined by skip conditions. (Author)

AD-603 780 Div. 2
OTS Prices: HC $1.00/MF $0.50

[California Univ., Berkeley].
INTERPLANETARY MEDIUM PHYSICS AND COMET TAILS.
Final rept.,
by John C. Brandt. 1964, 6p
Grant Nonr G00036 63, Proj. NR046 796

Unclassified report

Descriptors: (*Space environmental conditions, Physics), (*Comets, Analysis), Interstellar matter, Gases, Plasma medium, Dust, Solar radiation, Celestial mechanics.

AD-603 790 Div. 2, 12
OTS Prices: HC $7.00/MF $1.75

American Science and Engineering, Inc., Cambridge, Mass.
A RESEARCH PROGRAM TO INVESTIGATE THE CHARGED PARTICLE FLUX IN THE NEAR-EARTH MAGNETOSPHERE FROM A P-11 SUB-SATELLITE.
Final rept.,
by F. R. Paolini, R. Giacconi, J. R. Waters, and T. G. Quinn, Jr. May 64, 355p ASE-546

Carbon dioxide, Liquid rocket propellants, Launching, Flight testing, Feasibility studies, Ejection.

Test flights of the Cricketsonde rocket were conducted to determine the operational feasibility of this low level meteorological rocket system. Designed as an inexpensive reliable and safe method for obtaining meteorological data up to 3,000 ft. altitude; the Cricket employs a cold-type propellant and a 403 mc radiosonde telemetry package which is ejected at apogee and descends by parachute. Flight results indicate that the Cricketsonde has a good potential as an operational system. Problem areas relating to its optimum use are explored. (Author)

AD-603 625 Div. 2, 25, 30
OTS Prices: HC $3.00/MF $0.75

Ionosphere Research Lab., Pennsylvania State Univ., University Park.
METHODS FOR OBTAINING ELECTRON DENSITY PROFILES FROM CAPACITIVE IONOSPHERIC ROCKET PROBES.
Scientific rept.,
by P. E. Crouse. 15 May 64, 86p IRL-208
Contract AF19 628 4050 and Grant NsG134 61,
Proj. 8653, Tasks 865302, 07 007
AFCRL 64 529
Unclassified report

Descriptors: (*Electron density, Ionosphere), (*Ionosphere, Electron density), (*Sounding rockets, Probes (Electromagnetic), Radiofrequency, Resistance (Electrical), Capacitance, Plasma sheath, Telemetering data, Solar Eclipses, Measurement, Theory, Equations, Low frequency, Test methods.

Two rockets were fired in July, 1963 at Fort Churchill, Canada, in which the nosecone was insulated and the resistive and capacitive components of the admittance of two frequencies were measured between this insulated portion of the rocket and the main rocket body. A previous report by Herman, (AD-403 135), has described the theory on which the reduction of these measurements to electron density and collision frequency profiles can be accomplished. This procedure has since been modified to utilize the Sen-Wyller generalization of the Appleton-Hartree equation and has been applied to the analysis of the two experiments. The first firing took place during the solar eclipse of 20 July, 1963 at 4:05 p.m. L.M.T. when the percentage of totality was approximately 93%. The second firing took place on 26 July, 1963 at approximately the same local time. Electron density and collision frequency profiles for the two experiments are presented. (Author)

AD-603 670 Div. 2, 30, 32, 33
OTS Prices: HC $5.00/MF $1.00

RAND Corp., Santa Monica, Calif.
A MODEL OF METROPOLIS,
by Ira S. Lowry. Aug 64, 158p RM-4035-RC
Unclassified report

Descriptors: (*Urban areas, Mathematical models), (*Mathematical models, Urban planning), (*Programming (Computers), Urban planning), Statistical analysis, Distribution (Economics), Population (Mathematics), Housing, Transportation, Commerce, Economics, Traffic, Pennsylvania, Decision theory, Operations research, Simulation.

This report describes a computer model of the spatial organization of human activities within a metropolitan area. The model is intended for eventual use as 1) a device for evaluating the impact of public decisions (e.g., concerning urban renewal, tax policies, land-use controls, transportation investments) on metropolitan form; and 2) a device for predicting changes in metropolitan form which will follow over time as a consequence of currently visible or anticipated changes in key variables such as the pattern of 'basic' employment, the efficiency of the transportation system, or the growth of population. The development of the model to the stage at which it becomes a practical tool for planning and decision-making will require more time and effort. The first-generation model described in this report has been fitted to data for Pittsburgh, Pennsylvania, and enough experimental computer-runs have been completed to allow an appraisal of the practicability of my approach, and to indicate the strong and weak points of the model and also of the available data. The findings reported here offer guidance both to the development of a second-generation model and to data-collection programs. (Author)

AD-603 695 Div. 2, 30
OTS Prices: HC $3.00/MF $0.75

Coast and Geodetic Survey, Washington, D. C.
LIBYAN EARTHQUAKE OF FEBRUARY 21, 1963,
by David W. Gordon. 1964, 80p
Unclassified report

Rept. on Vela-Uniform.

Descriptors: (*Libya, Earthquakes), (*Earthquakes, Libya), (*Seismology, Libya), Mechanical waves, Seismic waves, Explosion effects, Seismographs, Correlation techniques, Geophysics, Data, Tables, Graphics.

A study of this event was undertaken to contribute to the basic data concerning earthquakes and to gain an appreciation of possible differences between seismic waves excited by earthquakes contrasted with explosions. Seismograms recorded by World-Wide Standardized Seismograph (WWSS) stations served as the principal source of information in this research. Tabular and graphical data resulting from this study are included.

AD-603 696 Div. 2, 30, 5
OTS Prices: HC $2.00/MF $0.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
TIME SERVICE IN THE USSR.
Special rept.5 Aug 64, 26p
ATD P6448; TT 71205
Unclassified report

Report on Surveys of Soviet-Bloc Scientific and Technical Literature.

Descriptors: (*Time signals, USSR), Time, Clocks, Corrections, Radio broadcasting, Radiofrequency, Radio stations.

AD-603 725 Div. 2
OTS Prices: HC $3.00/MF $0.75

Davos Observatory (Switzerland).
INVESTIGATION ON THE INFLUENCE OF CLOUDS ON ULTRAVIOLET SKY RADIATION (AT 330 MILLIMICRONS AND 370 MILLIMICRONS.
Technical note no. 3,
by Paul Bener. Mar 64, 59p
Contract AF61 052 618
AFCRL 64 565
Unclassified report

Descriptors: (*Aurorae, Spectroscopy), Line spectrum, Emissivity, Phototubes, Construction, Electron density, Temperature, Brightness, Ionosphere, Absorption, Whistlers, Nitrogen, Sky brightness, Norway.

Research in the following areas is summarized: rapid movements of auroral rays, construction and application of a four channel photometer for auroral research; current densities in visual aurora; temperature measurements; relation between auroral luminosity and ionospheric absorption; studies of the hydrogen line emissions; very low frequency emissions from aurora.

AD-603 861 Div. 2, 30, 8
OTS Prices: HC $5.00/MF $1.00

International Business Machines Corp., Rockville, Md.
OPTIMIZED DIGITAL AUTOMATIC MAP COMPILATION SYSTEM.
Final technical rept. for 30 Jan 63-10 Jul 64,
by F. D. Schulman, W. Gilman, J. V. Sharp, and R. L. Christensen. 10 Jul 64, 165p
Contract DA44 009AMC111X, Proj. 8T35 14 001 07
Unclassified report

Descriptors: (*Photogrammetry, Digital systems), (*Analog-digital computers, Stereoscopes), (*Digital systems, Photogrammetry), Mapping, Feasibility studies, Programming (Computers), Terrain, Digital computers, Orthophotography, Electronic scanners, Compilers, Surveying, Optimization, Automatic.

The primary purpose of the DAMC project is to optimize system hardware and computer programs, and to develop and evaluate alternate correlation techniques. The objective is to prove conclusively the concept of digital map compilation. The system consists of a photo digitizer unit for scanning and digitizing a pair of stereo aerial diapositives, specially written computer programs for use on an IBM 7090/7094 Computer to perform resection, rectification, correlation, and orthocorrection of the digital photo data, and a photomap printer unit for printing the rectified photo, the contour manuscript with or without grid tic marks, and the orthophoto map with or without contours and grid tic marks.

AD-603 868 Div. 2, 20
OTS Prices: HC $1.00/MF $0.50

Brandeis Univ., Waltham, Mass.
THE THERMAL AND ELECTRICAL CONDUCTIVITY OF COOLING STELLAR PLASMA EMITTING NEUTRINOS.
Scientific rept. no. 4,
by Ik-ju Kang and Jack S. Goldstein. 10 Jun 64, 24p
Contract AF19 604 7283, Proj. 8608, Task 860805
AFCRL 64 528
Unclassified report

Descriptors: (*Stars, Plasma physics), (*Plasma medium, Cooling), Thermal conductivity, Electrical conductance, Density, Temperature, Electrons, Transport properties, Electron capture, Neutrinos, Nuclear reactions.

The contribution of the URCA process to the thermal and electrical conductivities is calculated for the cooling stellar plasma, whose mass density is of the order of 1,000,000 g/cc. or more, and the temperature of which is of the order of 10 to the 9th power K, based on the assumption that the number of degenerate electrons is conserved in first order. The contribution is found to enhance the transport coefficients, but is negligibly small for the range of mass density 10 to the 6th power to 10 to the 15th power g/cc. (Author)

AD-603 964 Div. 2, 30
OTS Prices: HC $2.00/MF $0.50

Advanced Metals Research Corp., Burlington, Mass.
TECHNIQUES FOR IDENTIFICATION HANDLING AND ANALYSIS OF EXTRA-TERRESTRIAL PARTICLES.
Final rept.
by M. Plansky and R. F. Carnevale. 30 Apr 64, 36p
Contract AF19 628 2761, Proj. 7667, Task 766703
AFCRL 64 540
Unclassified report

Descriptors: (*Meteorites, Analysis), (*Upper atmosphere, Particles), Space environmental conditions, Dust, Contamination, Handling, Identification, Electron microscopy, Chemical analysis, Disks, Beryllium, Electron beams, Feasibility studies, Collecting methods, Sounding rockets.

A technique is described for inflight shadowing of collected upper atmosphere particles which enables the discrimination of contamination particles from extra-terrestrial particles. A method of transferring sub-micron particles from the electron microscope substrates to beryllium discs for chemical analysis employing the electron probe is also described. Electron microscopic examination of samples from a rocket collection and size distribution of the collected particles is presented and evaluated. Electron probe qualitative analysis of a number of collected particles after transfer to a beryllium disc has demonstrated the feasibility of this technique as an aid in particle identification. (Author)

AD-603 971 Div. 2, 9
OTS Prices: HC $3.00/MF $0.50

Hydrodynamics Lab., Mass. Inst. of Tech., Cambridge.
WAVE INDUCED OSCILLATIONS IN HARBORS: THE EFFECT OF THE VARIATION OF GEOMETRIC PARAMETERS ON THE RESPONSE OF RECTANGULAR HARBORS.
Rept. no 70,
by A. T. Ippen and Q. N. Fattah. Jun 64, 52p
MIT-DE-R64-24, DSR-8228
Contract Nonr 1841 59, Proj. NR062 228
Unclassified report

Descriptors: (*Harbors, Hydrology), (Water waves, Resonance), Harbor models, Geometric forms, Model basins, Hydrodynamics, Frequency, Oscillation, Energy.

The study deals with an additional phase of the response characteristics of a rectangular harbor in relation to waves incident on the restricted opening to the 'open sea'. An increase in aspect ratio results in a general decrease of the relative harbor length (ratio of harbor length to wave length) at resonance for the three principal modes of resonance. Maximum amplification inside the harbor in terms of outside wave height, however, depends on the mode of resonance as the aspect ratio changes. The relative harbor length at resonance exhibits the trends predicted by the closed basin expression for variation in aspect ratio, but differs in magnitude and shows certain anomalies not present for the closed basin. Discontinuities for these variations exist at values of the aspect ratio where closed basin theory predicts two possible modes of resonance. (Author)

AD-603 991 Div. 2
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TEMPERATURES AND MOTIONS OF THE UPPER

Contract AF19 628 2392, Proj. 8600, Task 860006
AFCRL 64 435

Unclassified report

Descriptors: (*Scientific satellites, Payload), (*Van Allen radiation belt, Spectroscopy), Charged particles, Protons, Electrons, Distribution, Plasma media, Probes (Electromagnetic), Radiation measurement systems, Nuclear spectroscopy, Geiger counters, Magnetometers, Solar cells, Wiring diagrams, Test methods, Calibration, Data processing systems, Orbital trajectories.

Three instrument packages were designed, developed, constructed, tested and calibrated for the purpose of investigating energy spectra and angular distributions of protons and electrons in the Earth's magnetosphere from a P-11 sub-satellite. The principles of operation, complete circuit diagrams, testing and calibration procedures, and calibration curves pertaining to the ASE instruments are presented in detail. Pertinent payload integration information is given. Methods of data handling, reduction and analysis, including those aspects dependent upon computer utilization, are outlined. One of the instrument packages was flown on Air Force Satellite 1963-25B. Some preliminary results on energy spectra obtained from early orbits are given. Geiger counter and electron spectrometer rate of energy deposition data illustrated belt profiles as expected, with distinct inner and outer zones with a well defined slot between them. (Author)

AD-603 796 Div. 2, 5
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE G LAYER OF THE IONOSPHERE,
by Donald H. Menzel and Dana K. Bailey.
16 Aug 47, 8p P-3

Unclassified report

Prepared in cooperation with Harvard College Observatory, Cambridge, Mass. and Douglas Aircraft Co., Inc., Santa Monica, Calif. A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Ionosphere, Wave transmission), Ionospheric propagation, Atmospheric sounding, Ionospheric disturbances, Diurnal variations, Terrestrial magnetism.

It is suggested that the maximum critical radio pulse frequency observed by equatorial stations is due to the G layer of the ionosphere, rather than to the F2 layer. It is further proposed that a diurnal deficiency of ion density in the equatorial band arises from a drift of F2 ions toward higher latitudes due to daytime thermal expansion of the lower neutral particles.

AD-603 797 Div. 2, 8
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON A NEW METHOD FOR EXPLORING THE UPPER IONOSPHERE,
by Dana K. Bailey. 3 Oct 47, 18p P-4

Unclassified report

Prepared in cooperation with Douglas Aircraft Co., Inc., Santa Monica, Calif. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ionosphere, Ionization), (*Refraction, Ionosphere), Electron density, Extraterrestrial radio waves, Measurement, Radio reception, Angle of arrival, Antennas, Equations.

The extensiveness and intensity of the ionization in the region above the height of maximum ionization of the F2 layer of the ionosphere is not known. It is shown that measurements of the refraction experienced by radio waves arriving at the earth after passage through the entire ionosphere can yield information about the uppermost regions of the ionosphere. An expression for the refraction of radio waves which pass through a parabolic layer model is derived. This permits a range of frequencies to be specified within which profitable refraction measurements can be made. Either the sun, which emits radio waves in the form of noise, or the moon, which can be used to return radio waves originating on the earth, is a suitable extraterrestrial source of radio waves. An experimental technique for measuring refraction is described and discussed. (Author)

AD-603 848 Div. 2, 13
OTS Prices: HC $3.00/MF $0.50

National Engineering Science Co.,, Washington, D. C.
THE ASH WEDNESDAY EAST COAST STORM, MARCH 5-8, 1962. A HINDCAST OF EVENTS, CAUSES, AND EFFECTS,
by Charles L. Bretschneider. 17 Jul 64, 57p
SN-134-4
Contract Nonr4177 00

Unclassified report

Paper presented at Conference on Coastal Engineering (9th), Lisbon, Portugal, June 1964.

Descriptors: (*Storms, Seacoast), (*Seacoast, Storms), Wind, Ocean waves, Tides, Erosion, Beaches, Configuration, Hydrographic surveying, Marine Meteorology, Oceanology, Data, Graphics.

Hindcasts were made for winds, waves and tides for several east coast locations for the storm of 5-8 March 1962. A limited amount of recorded data and a considerable amount of other observations were available from near-by and remote stations. The data were analyzed for correlation of 'calibration' purposes in order to improve the 'state of the art' of wave and storm surge hindcasting for locations where recorded data were not available. Wind records were analyzed to obtain sustained wind speeds, average gust factors, and probability distribution of gust factors. Isobaric patterns were used to determine sustained wind speeds over the water fetch for deep and shallow water waves and storm surge hindcasts. Wave run-up calculations were made to determine the wave activity on the beach and the dunes and were used to estimate the probable rate of beach erosion and dune evolution. The off-water wind speeds were modified to determine wind speeds over the beach and over the top of the dunes. Finally, by summarizing the time-history of the various meteorological, oceanographic, and coastal engineering events, a very interesting scientific and engineering evaluation of the causes and effects can be made. (Author)

AD-603 849 Div. 2
OTS Prices: HC $1.00/MF $0.50

Norwegian Inst. of Cosmic Physics.
STUDIES OF LOCAL MORPHOLOGY, STRUCTURE AND DYNAMICS OF AURORA.
Summary rept. for 1 Mar 63-31 May 64.
31 May 64, 16p
Contract AF61 052 680
AFCRL 64 601

Unclassified report

nanometers; Sky brightness; Sky polarization; Infrared radiance; Albedo of the earth; and Temperature inside the Spectrophotometer.

AD-604 040 Div. 2
OTS Prices: HC $4.00/MF $1.00

Stanford Electronics Labs., Stanford Univ., Calif.
THE DISTRIBUTION OF IONS AND ELECTRONS IN THE EARTH'S EXOSPHERE.
Technical rept. no. 4,
by J. J. Angerami and J. O. Thomas. Dec 63, 134p
SEL-63-110, SEL TR-3412-3
Grants NsG30 60 and AF AFOSR62 370
AFOSR 64 1370

Unclassified report

Descriptors: (*Exosphere, Charged particles), (*Plasma medium, Exosphere), Upper atmosphere, Ions, Electrons, Distribution, Theory, Electric fields, Centrifugal fields, Gravity, Terrestrial magnetism, Electron density, Whistlers, Scientific satellites.

The factors which govern the distribution of electrons and ions in the earth's exosphere are discussed. The theory takes into account the effect of the electric field which arises from charge separation, the centrifugal force arising from the rotation of the earth and the effect of the earth's gravitational field. It is assumed that the charged particles are constrained to move only along the direction of the earth's magnetic lines of force. The modifications that result in the electron and ion distributions when a temperature variation is assumed along a line of force are also considered. The results predicted by the theory are compared with actual experimental observations of the exospheric plasma which have been obtained in recent years using whistlers and using topside ionograms made by the Alouette satellite. (Author)

AD-604 048 Div. 2
OTS Prices: HC $2.00/MF $0.50

Hamburger Sternwarte (West Germany).
STRUCTURE AND DEVELOPMENT OF COMETARY TAIL.
Final rept.
by K. Wurm. 31 Mar 64, 49p
Contract AF61 052 583
AFCRL 64 646

Unclassified report

Descriptors: (*Comets, Physical properties), Astrophysics, Gases, Ions, Ionization, Sodium, Carbon, Nitrogen, Parabolic bodies, Emissivity, Equations, Solar radiation, Solar wind, Spectroscopy, Velocity.

The physical conditions in comets which lead to the formulation of type I-tails are discussed. The report comprises the following five seperate papers: (1) The ionization in comets; (2) brightness and structure of the Na-emission in comets; (3) the heads of comets and the lifetimes of their molecules; (4) the axes of the type I - tails of comets; and (5) an expanding halo of comet alcock (1963b) index cards.

AD-604 049 Div. 2, 15
OTS Prices: HC $6.00/MF $1.25

Deutscher Wetterdienst, Frankfurt (West Germany).
RESEARCH IN OBJECTIVE WEATHER FORECASTING.
Summary rept. no. 2, 1 Jul 61-31 Dec 63,
by G. Bell. 31 Dec 63, 240p
Contract AF61 052 373
AFCRL 64 600

Unclassified report

Includes Summary rept. no. 1, which was published only in preliminary form.

Descriptors: (*Weather forecasting, Scientific research), Mathematical models, Air mass analysis, Barometric pressure, Wind, Mathematical prediction, Numerical methods and procedures, Programming (Computers), Meteorology.

The numerical stability properties of a unfiltered baroclinic model which uses a simplified version and a periodic channel current are studied in detail. A numerical experiment on the behavior of initially barotropic disturbances in a baroclinic channel over a forecast period of 12 days is presented. For the experiments in most cases non-divergent initial wind fields were computed from the geopotential by means of the balance-equation; the procedure applied for solving it is reported. A calculus which facilitates the derivation of the ellipticity criterion for more complicated forms of the balance-equation is introduced. Automatic decoding and objective analysis processes to be applied in order to obtain actual initial data in a format acceptable to computers are presented. A filtered method, which does not exclude the noise waves but rather converts these waves into harmless phenomena is considered. By use of a very simple linearized version of the barotropic model, the filtering process is studied more generally and hints for the specialisation of more efficient diagnostic relations in the atmosphere are included.

AD-604 069 Div. 2, 4, 30
OTS Prices: HC $6.00/MF $1.50

Technical Military Planning Operation, General Electric Co., Santa Barbara, Calif.
COMPUTER SOLUTION OF TRANSIENT AND QUASI-EQUILIBRIUM ATMOSPHERIC DEIONIZATION EQUATIONS,
by Walter F. Dudziak. 1 May 61, 294p R61TMP-33
Contract DA49 146XZ038
DASA 1233

Unclassified report

Descriptors: (*Atmosphere, Recombination reactions), (*Programming (Computers), Atmosphere), Ions, Chemical equilibrium, Equations, Ionization, Temperature, Electromagnetic waves, Absorption, Electron density.

Two computer programs are described for use on the IBM-704/7090 electronic data processing machines or any large computer accepting FORTRAN. The necessary modifications for use on these two computers are simple and self-evident. One of these programs deals with the numerical solution of the three equation, transient deionization phenomena. The second program deals with the solution of the deionization phenomena under quasi-equilibrium conditions that are derivable from the three equation transient solution. The second quasi-equilibrium computer program also calculates (1) the modified collision frequency as effected by temperature and the presence of partial ionization, (2) the differential and integrated absorption of electromagnetic waves through the assumed ionosphere. Included also in these programs are other features described in this report that in their present form do not yield very useful information. (Author)

AD-604 094 Div. 2
OTS Prices: HC $2.00/MF $0.50

Woods Hole Oceanographic Institution, Mass.

ATMOSPHERE,
by William W. Kellogg. 17 Nov 51, 34p P-246
Unclassified report

Legibility of this document is unsatisfactory; reproduction has been made from best available copy.

Descriptors: (*Upper atmosphere, Atmosphere models), (*Atmospheric motion, Upper atmosphere), (*Atmospheric temperature, Upper atmosphere), Sounding rockets, Radiosondes, Sound Signals, Radio waves, Propagation, Meteors, Noctilucent clouds, Sky brightness, Aurorae, Searchlights, Ozone, Atmospheric tides, Heat transfer, Wind, Diurnal variations, Reviews.

AD-603 999 Div. 2
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A QUANTITATIVE ANALYSIS OF TWO PROPOSED MECHANISMS FOR VERTICAL OZONE TRANSPORT IN THE LOWER STRATOSPHERE,
by William W. Kellogg. 17 Dec 51, 4p P-259
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Stratosphere, Ozone), (Ozone, Stratosphere), Atmospheric motion, Density, Periodic variations.

AD-604 001 Div. 2
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PHYSICAL PROPERTIES OF THE ATMOSPHERE BETWEEN APPROX. 80 km AND 250 km,
by H. K. Kallmann. 4 Jan 52, 14p P-261
Unclassified report

Rept. on Proj. RAND. Presented at the Meeting of the American Geophysical Union-Meteorological Section, California Inst. of Tech., Pasadena, 8-9 Feb 52. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Atmosphere, Molecular weight), Physical properties, Temperature, Pressure, Density, Oxygen, Nitrogen, Dissociation.

A relation between the fractional change of concentration with change in height, provided a temperature and its gradient are known at one height, gives the possibility of determining the change in molecular weight with change in temperature and altitude. The molecular weight of the atmosphere between 80 km and 125 km was obtained, assuming molecular oxygen dissociates in this region. The molecular weight of the atmosphere between 130 km and 250 km was obtained, assuming nitrogen dissociates in this region. The calculated values for pressure and density agree quite well with the data obtained from rocket flights, although one may regard this approach as satisfactory only in a qualitative way, because of the rather simple form chosen for the fractional change of concentration with change in height. But in veiw of the uncertainties involved in determining the radiation density, absorption cross section, etc., it is believed that the proposed treatment gives correctly the essential features such as total pressure, mean molecular weight, mean density, and average particle density of the atmosphere at the altitudes considered. (Author)

AD-604 031 Div. 2, 19, 25, 30
OTS Prices: HC $6.00/MF $1.25

Nortronics Div., Northrop Corp., Palos Verdes Estates, Calif.
HIGH ALTITUDE DAYTIME SKY BACKGROUND RADIATION MEASUREMENT PROGRAM. PART I. SKY LUMINANCE, POLARIZATION, AND ALBEDO DATA FROM RESEARCH VEHICLE NO. 1.
May 64, 242p NORT-64-74
Contract AF33 657 11081, Proj. 4200, Task 420011
AL TDR64 134 P1
Unclassified report

Descriptors: (*Star trackers, Research program administration), (*Sky brightness, Experimental data), (*Spectroscopy, High altitude), Polarization, Luminescence, Albedo (Astronomy), Ultraviolet radiation, Infrared radiation, Star trackers, Inertial guidance, Research planes, Terrain, Flight paths, Spectrophotometers, Electromagnetic waves, Programming (Computers), Airborne.

The radiation characteristics of the daytime sky background are a primary factor in establishing the performance characteristics of star tracking components for stellar-inertial guidance systems. A high resolution Spectrophotometer was developed which has been operated during high altitude flights of Research Vehicle 1 to measure the radiance, polarization, luminance, spectral distribution, and luminance ratios (albedo) of the daytime sky. The spectral range of investigation is from the near ultraviolet to the near infrared. Data were recorded from 20,000 to 70,000 feet altitude during six flights covering all daytime conditions from sunrise to sunset. The terrain over which data were taken included the California desert, the ocean, and a mountain range. (Author)

AD-604 032 Div. 2, 19, 25, 30
OTS Prices: HC $15.70/MF $5.00

Nortronics Div., Northrop Corp., Palos Verdes Estates, Calif.
HIGH ALTITUDE DAYTIME SKY BACKGROUND RADIATION MEASUREMENT PROGRAM. PART II. SKY SPECTRAL RADIANCE FROM RESEARCH VEHICLE NO. 1.
15 May 64, 1267p
Contract AF33 657 11081, Proj. 4200, Task 420011
AL TDR64 134 P2
Unclassified report

Original contains transparent overlay which cannot be reproduced. Original may be seen at DDC.

Descriptors: (*Star trackers, Research program administration), (*Sky brightness, Experimental data), (*Spectroscopy, High altitude), Polarization, Luminescence, Albedo (Astronomy), Flight paths, Terrain, Infrared radiation, Inertial guidance, Spectrophotometers, Airborne, Temperature, Electromagnetic waves, Research planes.

The data presented represents seven flights of the research vehicle. The objective of the flight program was to obtain sky background data over various types of terrain at various times of the day. Two of the six contract flights were made over Edwards Air Force Base, California. Three flights were made over the Sierra Nevada mountain range in California, and one flight was made over the Pacific Ocean. Details of each flight are given in this part immediately preceding the corresponding raw data. During the flights, the Spectrophotometer measured the following: Spectral radiance of the sky between 350 nanometers and 750

self-consistent fields (the fermi-dirac statistics, the self-consistend field, the exchange potential); the opacity (determination of absorption coefficients and the rosseland mean opacity, conclusions' astrophysical implications).

AD-604 169 Div. 2, 30
OTS Prices: HC $5.00/MF $1.00

Technitrol Engineering Co., Philadelphia, Pa.
COORDINATE TRANSFORMATION,
by F. H. Collins. Sep 63, 162p
Contract Nonr1907 00
NAVTRADEVCEN 1907 7315

Unclassified report

Descriptors: (*Maps, Transformations), (*Transformations, Maps), Printed circuits, Magnetic tape, Scanning, Computers, Platters, Programming (Computers).

A study was conducted to determine the mathematical processes required for the transformation of a source map of one projection into another map of a different projection via an electronic system concept. The projections considered for this study were two of the more popular ones being used quite frequently by various mapping agencies today, the Mercator projection and the Lambert conformal projection. The study entailed two type transformations; one being a projection grid transformation and the other being an outline map of the United States being transformed. Both transformations showed accuracy to within one hundreth of an inch. The conclusions arrived at were that if a need for such transformations arose, no matter what projections involved, the system concept could be utilized and a map transformation could be done automatically. (Author)

AD-604 182 Div. 2
OTS Prices: HC $3.00/MF $0.75

Harvard Coll., Cambridge, Mass. Museum of Comparative Zoology.
SOURCE MATERIAL OF THE WESTERN NORTH ATLANTIC; AN INVENTORY.
Final status rept. for 1 Jul 60-31 Mar 64,
by C. W. Thomas and C. P. Backman. 31 Mar 64, 64p
Contract Nonr1866 47, Proj. NR101 727

Unclassified report

In cooperation with the American Geographical Society. Rept. is In Memorium, Capt. Charles P. Backman, MC, U. S. Army (Retired).

Descriptors: (*Naval research, Oceanographic data), (*Oceanographic data, Inventory), (*Atlantic Ocean, Oceanology), Ocean bottom sampling, Oceanographic vessels, Marine biology, Marine geology, Geography, Temperature, Hydrographic surveying, Tables, Bibliographies.

The Inventory of Source Materials was fundamentally concerned with the physical oceanography, biology and geology of the western North Atlantic continental shelf and adjacent waters. Information elicited by the Inventory was recorded on 3 x 5-inch cards, which are filed at the Museum of Comparative Zoology. A copy of the Inventory was furnished the National Oceanographic Data Center. (Author)

AD-604 197 Div. 2, 20
OTS Prices: HC $2.00/MF $0.50

Iowa State Univ., Iowa City.
ON THE RELATIONSHIP BETWEEN ABSOLUTE SOLAR COSMIC RAY INTENSITY AND RIOMETER ABSORPTION,
by J. A. Van Allen, W. C. Lin, and H. Leinback.
Jul 64, 44p SUI-64-29
Contract N9onr93803

Unclassified report

Descriptors: (*Cosmic rays, Absorption), (*Solar radiation, Cosmic rays), Atmosphere, Proton bombardment, Alpha bombardment, Intensity, Extraterrestrial radio waves, Polar regions, Nuclear spectroscopy, Scientific satellites.

A study was made of eight separate solar cosmic ray events during 1960 using (a) observations above the atmosphere by satellite Explorer VII of the integral omnidirectional intensity of particles J sub o (E > E sub o), where E sub o is 30 MeV for protons and 120 MeV for alpha particles; and (b) corresponding riometer values of atmospheric absorption A of cosmic radio noise at 27.6 mc/sec from College and Thule stations. It is concluded that atmospheric absorption over the polar caps is often due predominantly to protons of energy less than 30 MeV and/or to alpha particles of energy less than 120 MeV; and that the spectral form in the vicinity of these values of energy varies greatly from event to event and tends to remain about the same or to become steeper (softer) with increasing time during a given event. (Author)

AD-604 249 Div. 2, 4, 25
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
PHYSICAL AND CHEMICAL PARAMETERS AFFECTING THE DAMPING OF CAPILLARY WATER WAVES BY MONOMOLECULAR LAYERS OF ORGANIC MATERIALS.
Interim rept.
by W. D. Garrett. 30 Jul 64, 15p
NRL 6114

Unclassified report

Descriptors: (*Water waves, Damping), (*Monomolecular films, Water waves), (*Surface-active substances, Monomolecular films), Organic materials, Physical properties, Chemical properties, Compressive properties, Pressure, Surface area, Phase studies, Ocean waves, Frequency.

The wave-damping action of chemically pure, as well as naturally occurring substances, was studied under controlled laboratory conditions using mechanically generated transverse water waves. The decay constant or damping coefficient was shown to increase abruptly at film pressures of less than one dyne/cm to a maximum value and to remain relatively constant as film pressure is increased further. The onset of the damping effect was closely related to major changes in the compressibility of the adsorbed insoluble monolayer. The damping coefficient for insoluble monolayers was independent of the initial wave amplitude but was linearly dependent upon the frequency. Plots of the damping coefficient (k) versus molecular area at several frequencies indicated that the abrupt damping coefficient increase was a function of monolayer compressibility and not frequency, although k attained a higher maximum value at larger frequencies. (Author)

AD-604 255 Div. 2, 19
OTS Prices: HC $2.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.

NARRATIVE OF CHAIN CRUISE NO. 17, PHASE I: ST. GEORGE, BERMUDA, TO FREETOWN, SIERRA LEONE, 19 FEBRUARY - 22 MARCH 1961,
by Arthur D. Voorhis and Elizabeth T. Bunce.
Jun 64, 32p WHOI Ref-64-30
Contract Nonr2196 00

Unclassified report

Descriptors: (*Oceanology, Atlantic Ocean), (*Atlantic Ocean, Tropic regions), (*Ocean currents, Tropic regions), Bathythermograph data, Oceanographic vessels, Instrumentation, Oceanographic data, Maps, Seismology, Temperature, Velocity, Africa, Bermuda, Ocean bottom, Marine geology, Ocean bottom topography.

The journal of a cruise of R/V CHAIN from Bermuda to Freetown, Sierra Leone during February and March, 1961, is the basis of this report. Location of observations are given. The portion of the Mid-Atlantic Ridge lying along the equator was surveyed from 10 to 19 degrees W, and new information concerning the slope and orientation of rift zones was obtained. A detailed bathymetric survey of the Romanche Trench was made. A continuous temperature-depth profile, from the surface to 100 meters, was made along the ship's track with a thermistor chain. Surface shear was measured with pitotmeters mounted on the chain (surface water velocity relative to the water velocity at the depth of the pitotmeter), to determine the strength and direction of the equatorial undercurrent. (Author)

AD-604 098 Div. 2
OTS Prices: HC $1.00/MF $0.50

Rochester Univ., N. Y.
ISOTOPIC COMPOSITION OF LOW ENERGY HYDROGEN NUCLEI IN THE PRIMARY COSMIC RADIATION,
by G. D. Badhwar. 8 Jul 64, 18p URPA-45
Grant AF AFOSR439 63

Unclassified report

Supported in part by NASA.

Descriptors: (*Cosmic rays, Isotopes), (*Deuterons, Cosmic rays), (*Tritons, Cosmic rays), Hydrogen, Distribution, Upper atmosphere, Photographic emulsions.

The abundance of low energy deuterons and tritons was determined in a nuclear emulsion stack exposed at Fort Churchill, Manitoba, Canada on August 4, 1962 under 4.2 g/sq cm of residual atmosphere. Using the grain density vs. residual range method for the identification of tracks produced by particles, the differential flux of deuterons and tritons was determined. The results appear to be consistent with the absence of deuterons and tritons in the primary cosmic radiation. An upper limit on the amount of hydrogen traversed by low energy cosmic ray particles has been placed. (Author)

AD-604 105 Div. 2, 12, 16, 30
OTS Prices: HC $6.00/MF $1.25

Air Force Weapons Lab., Kirtland AFB, N. Mex.
BIBLIOGRAPHY OF EXTRATERRESTRIAL RESEARCH. Edition no. 2,
by Robert W. Henny. Jul 64, 256p
Proj. 1080
AFWL TDR64 29

Unclassified report

Descriptors: (*Planets, Bibliographies), (*Moon, Bibliographies), (*Bibliographies, Astronomy), Space biology, Space environmental conditions, Space probes, Space stations, Materials, Astrophysics, Extraterrestrial topography, Lunar environment, Lunar bases, Lunar trajectories, Exploration, Asteroids, Comets, Interstellar matter, Cratering, Research.

The purpose of this bibliography is to provide a reference source on all extraterrestrial research pertinent to lunar and planetary research. It is subdivided into the following categories: General, Moon, Planets, Extraterrestrial Materials, Cratering, and Bibliographies. Each category is separately alphabetized and cross indexed.

AD-604 122 Div. 2
OTS Prices: HC $3.00/MF $0.50

General Electric Co., Syracuse, N. Y.
DISPERSIVE CHARACTERISTICS OF THE IONOSPHERE.
Interim rept. no. 1.
Jun 64, 56p
Contract AF30 6(2.3360, Proj. 673A
RADC TDR64 219

Unclassified report

Descriptors: (*Ionosphere, Atmospheric sounding), (*Atmospheric sounding, Ionosphere), Ionospheric propagation, High frequency, Ionospheric disturbances, Scattering, Refraction, Radio stations, Antennas, Calibration.

The investigation is divided initially into three categories: (1) Determination of parameters of ionosphere profiles from forward oblique soundings, (2) Path loss and the parameters by which it is affected, and (3) Natural disturbances, irregularities, and their influence on categories 1 and 2. This effort includes the observation, study, and analysis of actual measurements made between the RADC propagation sites at Stockbridge, New York, and Panama, and several intermediary sites located between the two end points. Vertical, forward, and backscatter bidirectional soundings, together with data from a coordinated high resolution amplitude and relative time shift measuring system, are employed for use in the study. The report describes the progress made to date in several categories listed above. The initial effort required in preparation for the study is covered, including the preparatory technique for extracting information on oblique ionograms, equipment preparation, calibration of systems, and the study of refraction and ground effects related to the path loss investigation. The report also describes the observation periods thus far and the nature of the ionosphere during these periods. (Author)

AD-604 159 Div. 2
OTS Prices: HC $4.00/MF $0.75

RAND Corp., Santa Monica, Calif.
THE RADIATIVE OPACITY OF STELLAR MATTER.
Doctoral thesis,
by Harold Zirin. Dec 52, 111p P-351

Unclassified report

Descriptors: (*Stars, Optical properties), (*Optical properties, Stars), Electrons, Light transmission, Magnetic fields, Absorption Scattering, Emissivity, Ionization, Gases, Convection, Differential equations, Integral, Integration, Bessel functions, Hamiltonian, Quantum mechanics, Quantum statistics, Astrophysics.

Contents: the opacity problem (previous assaults on the barrier, outline of the calculation of opacity tables); wave functions (wave functions of free electrons, the computation of free electron wave funtions, bound states);

3. Chemical Warfare Equipment and Materials

AD-603 644 Div. 3
OTS Prices: HC $2.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
RESEARCH STUDIES ON THE DISSEMINATION OF SOLID AND LIQUID AGENTS.
Quarterly progress rept. no. 1, 1 Apr-30 Jun 64, by I. G. Poppoff. 7 Jul 64, 39p
Contract DA18 035AMC122A, Proj. PAU4900
Unclassified report

Descriptors: (*Chemical warfare agents, Distribution), (*Aerosols, Chemical warfare agents), Aerosol generators, Explosions, Pyrotechnics, Supersonic diffusers, Wind, Pollen, Electrostatics, Encapsulation, Powders, Oxidation, Pyrolysis, Hydrolysis, Drops, Ignition, Deflagration, Nucleation.

Current status is discussed of a research program designed to provide fundamental information regarding the processes involved in the dissemination of chemical agents. The scope and direction of the program are described. Specific subject areas covered are: (1) Explosive, thermal, ultrasonic and electrostatic aerosol production processes, (2) material treatment by encapsulation and coating techniques, (3) aerosol degradation by pyrolytic, oxidative, hydrolytic, pyrolytic and combustion processes. (Author)

AD-603 661 Div. 3, 13, 18
OTS Prices: HC $4.00/MF $0.75

Litton Systems, Inc., St. Paul, Minn.
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES.
Bimonthly progress rept. no. 6, 1 May-30 Jun 64, by M. I. Landsberg. 15 Jul 64, 120p LSI-2594
Contract DA18 108AMC214A
Unclassified report

Descriptors: (*Shelters, Safety), (*Biological warfare, Armed forces research), (*Decontamination, Biological warfare agents), Bacterial aerosols, Control systems, Environmental tests, Cooling and ventilating equipment, Adhesives, Medical research, Protective coverings, Textiles, Plastic coatings, Tents, Fluid dynamic properties, Purification.

Decontamination and protection studies
Environmental control systems
Material studies
Liner and airlock designs
CB pods
Pert program.

AD-604 093 Div. 3
OTS Prices: HC $1.00/MF $0.50

Southern Research Inst., Birmingham, Ala.
DESIGN STUDY TO DEVELOP INSTRUMENTATION FOR FIELD EVALUATION OF CHEMICAL AGENTS.
Bi-monthly progress rept. for Jun-Jul 64, by Alvin N. Bird, Jr. 20 Aug 64, 14p
SRIB-6928-1455-XVIII
Contract DA18 108AMC32A
Unclassified report

Descriptors: (*Chemical warfare agents, Instrumentation), (*Television cameras, Gas detectors), (*Electrolytic cells, Gas detectors), Aerosols, G agents, V agents, Counting methods, Circuits, Flash lamps, Gels, Coatings, Oximes, Hydrogen compounds, Cyanides, Meters.

Efforts were devoted to construction of the laboratory model flash-television particle counter and a wheel-shaped oxime-electrochemical cell. Both the counter and the wheel-type cell were described in AD-600 982. The particle counter is complete except for the flash lamp power supply. The wheel cell was tested with HCN and a mechanism was designed for coating the cell with oxime. The report describes the plans for evaluation of the counter, the results of the test of the wheel cell and the plans for the development of the electro-chemical agent meter. (Author)

AD-604 110 Div. 3
OTS Prices: HC $4.00/MF $0.75

Dalmo Victor Co., Belmont, Calif.
DESIGN AND CONSTRUCTION OF SPIRT (SHORT PATH INFRARED) INSTRUMENTATION.
Bimonthly progress rept. no. 1, 28 May-24 Jul 64, by F. J. Berg. 28 Jul 64, 112p DV-R-2976-3500
Contract DA18 035AMC129 A
Unclassified report

Descriptors: (*Gas detectors, Infrared equipment), (*Infrared equipment, Gas detectors), Instrumentation, G agents, Vapors, Infrared transmitters, Infrared receivers, Infrared radiation, Absorption, Measurement, Design, Airborne, Performance (Engineering), Signal-to-noise ratio, Servomechanisms, Band-pass filters.

This report presents a functional and analytical description of the prototype SPIRT instrument. Several alternate approaches have been studied. From the studies, a system design has been selected which best meets the contract requirements. An analog computer simulation of the system has been performed. Much of the system has been breadboarded, and design details have been completed in many areas. (Author)

AD-604 116 Div. 3, 4, 14
OTS Prices: HC $2.00/MF $0.50

West Virginia Pulp and Paper Co., New York.
ADSORPTION-DESORPTION PROPERTIES OF SORBENTS.
Bimonthly progress rept. no. 4, 19 May-18 Jul 64, by A. W. Loven and F. J. Vermillion. 4 Aug 64, 39p
Contract DA18 035AMC106A
Unclassified report

Descriptors: (*Chemical warfare agents, Adsorption), (*Adsorption, Materials), (*Carbon, Adsorption), Fibers, Rayon, Viscose, Charcoal, Coal, Porosity, Nitrogen, Organic phosphorus compounds, Thermodynamics, Hysteresis, Separation, Test methods.

Equilibrium adsorption data is reported for activated carbons of interest as chemical agent sorbents. Measurements were made with nitrogen at low temperature and with dimethyl methylphosphonate, DMMP, at 25 and 42C. The sorbents studied include activated carbon fibers made from Fortisan and viscose rayon, some highly activated coconut shell charcoal, and a coal-base carbon. The nitrogen data was combined with mercury porosimeter measurements to give the total pore volume distributions from 10 to 100,000A radius. Both carbon fibers show a greater proportion of volume in pores less than 10A than the other carbons. Isosteric

CORRELATION BETWEEN ATMOSPHERIC BACK-SCATTERING AND METEOROLOGICAL VISUAL RANGE,
by Robert W. Fenn. Jun 64, 26p
Task 1A0 11001B021 13
USAEL TR2481

Unclassified report

Descriptors: (*Atmosphere, Scattering), (*Visibility, Meterological parameters), (*Light signals, Scattering), Haze, Particle size, Aerosols, Optical properties, Humidity, Vapor pressure, Light transmission, Attenuation, Intensity, Water vapor, Fog, Clouds.

On the basis of present knowledge of the distribution of natural haze particles in the atmosphere, the relation between the back-scatter intensity and the visual range on the extinction coefficient has been analyzed. It can be shown that the various processes which cause the changes in visibility (increasing haze-particle number, change in haze particle-size distribution, etc.) result in rather different back-scatter conditions. Therefore, it cannot be expected that a unique relation between visibility and back-scatter signal can be found. A relation, visibility = f(back-scatter signal), with useful accuracy can be established only for specific atmospheric conditions; this relation, however, may be characteristic for certain geographical areas. These conclusions, derived from natural aerosol distributions and processes, are found to be in agreement with some published empirical data on scattering and visibility correlation. (Author)

AD-604 270 Div. 2
OTS Prices: HC $3.00/MF $0.75

Geophysical Sciences Lab., New York Univ., N. Y.
THIRD ORDER STEADY STATE SOLUTIONS FOR INTERSECTING TRAINS OF GRAVITY WAVES,
by Willard J. Pierson, Jr. Aug 64, 86p GSL-64-3
Contract Nonr285 57

Unclassified report

Descriptors: (*Gravity, Mechanical waves), (*Water waves, Gravity), Surface tension, Trigonometry, Equations.

Third order steady state solutions for intersecting trains of two or three (and more) gravity waves are found. Potential and kinetic energy does not transfer from two (or three) waves with special vector wave number characteristics to a new wave that increases in amplitude. Such singular solutions are eliminated by promoting third order terms nominally to first order and correcting the wave frequencies by additional second order terms. A body of theoretical work on this subject is shown to be wrong as it is based on the assumption that such steady state solutions do not exist. Additional contradictions between these results and results of others are pointed out. Suggestions for further work are given in connection with this extremely difficult problem. An appendix describes a computer program that was written to help do the algebra associated with this problem. (Author)

4. Chemistry

AD-603 532 Div. 4, 2
OTS Prices: HC $1.00/MF $0.50

Westinghouse Research Labs., Pittsburgh, Pa.
STUDY AND EXPERIMENTAL WORK ON ATOMIC COLLISION PROCESSES OCCURRING IN ATMOSPHERIC GASES.
Technical progress letter no. 39, 1 Apr-30 Jun 64,
by A. V. Phelps. 30 Jun 63, 5p, WRL-64-928-113-M5
Contract AF29 601 6271, Proj. 7811

Unclassified report

Descriptors: (*Atomosphere, Chemical reactions), (*Oxygen, Ionization), (*Water vapor, Ionization), Electrons, Ions, Recombination reactions, Gases, Xenon, Nitrogen.

Research progress in the following fields is summarized: electron-positive ion recombination: electron attachment in 02 and 02-H20 mixtures; attachment and detachment in 0-02 mixtures.

AD-603 537 Div. 4
OTS Prices: HC $2.00/MF $0.50

California Univ., Davis.
INFORMAL PHOTOCHEMISTRY CONFERENCE (6th): ABSTRACTS OF PAPERS PRESENTED, JUNE 15-17, 1964,
Final rept.,
by David H. Volman. 15 Jul 64, 41p
Grant DA ARO D31 124G503, Proj. 4544C
AROD 4544:1

Unclassified report

Descriptors: (*Photochemistry, Symposia), Reports, Abstracting, Bibliographies.

Abstracts from 33 papers on various aspects of photochemistry are presented.

AD-603 586 Div. 4
OTS Prices: HC $2.00/MF $0.50

Noyes Chemical Lab., Univ. of Illinois, Urbana.
AN NMR STUDY OF THE PROTOLYSIS KINETICS OF GLYCINE.
Technical rept. no. 72,
by M. Sheinblatt and H. S. Gutowsky. 28 May 64, 30p
Contract Nonr1834 13, Proj. NR051 215

Unclassified report

Supported in part by the National Institutes of Health and the National Science Foundation; prepared for publication in the Journal of the American Chemical Society.

Descriptors: (*Amino acids, Reaction kinetics), Decomposition, Nuclear magnetic resonance, Protons, Exchange reactions, Acid-base equilibria, pH, Amines, Esters.

The exchange of protons between the amino group of glycine and aqueous solvent was investigated by means of its effect upon the proton high resolution n.m.r. spectrum of the methylene group. The mean lifetime between exchanges of protons in the NH3(+) group was measured at room temperature as a function of glycine concentration and of hydrogen ion concentration. Similar studies were made of the glycine methly ester. Several mechanisms contributing to the exchange proved to be separable by means of the changes in mean lifetime with pH and glycine or ester concentration, and rate constants were obtained for the reactions. A brief comparison of these results with those obtained for other amino acids and for simple amines indicates that the proton exchange mechanism for positively charged amino groups in strongly acidic solutions are the same for the several types of such systems studied so far. (Author)

AD-603 605 Div. 4, 20
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
RADIOLYSIS OF PROPANE AT LOW CONVERSION.
Master's thesis,
by Norman Keith Blocker. Aug 64, 66p
AFIT GNE/Phys/64 2

Unclassified report

Descriptors: (*Aliphatic compounds, Radiation chemistry), (*Radiation chemistry, Aliphatic compounds), Hydrocarbons, Purification, Decomposition, Chromatographic analysis, Alkenes, Synthesis (Chemistry), Particle accelerators.

Low conversion studies of the radiolysis of propane were performed by the use of a technique which was developed to satisfy the stringent requirements of purity and trace analysis capability. The calculated G value for ethane in the low conversion region was 1.95. All other product yields were determined relative to this value. Significant increases in yields for propylene and ethylene were observed as the degree of conversion was decreased from 2.6 to 0.0045 per cent. These increases were attributed to the absence of internal scavenging reactions involving hydrogen atom attack on these products. A decrease in the yield of 2,3 dimethylbutane was accompanied by an increase in the yields of methane and ethane as the conversion was increased from 0.05 to 1.00 per cent. It was concluded that the initial yields for the radiolysis products were represented by the product yields at the lowest degree of conversion. (Author)

AD-603 615 Div. 4, 14, 20
OTS Prices: HC $6.00/MF $1.25

Air Force Inst. of Tech., Wright-Patterson AFB, Oh'o.
RE-EXAMINATION OF THE LUMINESCENT PROPERTIES OF THE MIXED PHENYL- AND P-BIPHENYLYL SILANES.
Master's thesis,
by Edward A. Peterson. May 64, 208p
AFIT GSP/Phys/64 11

Unclassified report

Descriptors: (*Silanes, Fluorescence), (*Fluorescence, Silanes), Phosphorescent materials, Silicone plastics, Impurities, Molecular structure, Absorption spectrum, Scintillation counters.

Some luminescent properties of the tetraaryl silane family composed of tetraphenyl silane, triphenyl-p-biphenylyl silane (Silane I), diphenyl-di-p-biphenylyl silane (Silane II), phenyl-tri-p-biphenylyl silane (Silane III), and tetra-p-biphenylyl silane (Silane IV) were re-examined to determine the effect of a p-quaterphenyl impurity on the luminescent properties previously reported. Molar extinction coefficient calculations indicate that the p-biphenylyl-substituted silanes absorb light in direct proportion to the number of p-biphenylyl molecules attached to the silicon atom. The absorption spectra are apparently not affected by the p-quaterphenyl impurity. The visible fluorescence previously reported for the p-biphenylyl silanes was found to be due to the p-quaterphenyl impurity. Pure silanes I, II, III, and IV have fluorescence emission in the 310-320 millimicron region. Phosphorescence in the

heats of adsorption of DMMP on the carbon fibers and the coal-base carbon are reported. It is suggested that the hysteresis in the DMMP systems is the result of the superposition of two phenomena, one the type seen in nitrogen adsorption entailing loop closure and the other an effect extending to lower pressures. Results of some desorption measurements with DMMP are discussed. (Author)

Dielectric properties, Refractive index, Viscosity, Thermochemistry.

The effect of solvents on the Si-H stretching vibration occurring at approximately 4.7 microns was studied. Forty-four different solvents, ranging from 1.8 to 40 in dielectric constant, and five silanes were studied. The silanes were triethyl silane, tricyclohexyl silane, diphenyl methyl silane, triphenyl silane, and tribenzyl silane. Triphenyl silane and diphenyl methyl silane were studied extensively in the paraffins (pentane to hexadecane plus paraffin oil). It was concluded that solvent effects, even in the case of the non-hydrogen bonded Si-H group, are the result of many interactions, both specific and non-specific, and that no relationship exists which can satisfactorily correlate infrared shifts with any property or properties of the solvent alone. A consideration of specific solute-solvent interactions appears to be the most plausible way of explaining infrared solvent-induced shifts.

AD-603 679 Div. 4
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
HIGH INTENSITY PHOTOLYSIS OF AZO COMPOUNDS AT 3600 A.
Master's thesis,
by Jack Oliver Terry. May 64, 92p
AFIT GNE/Phys/64 18

Unclassified report

Descriptors: (*Organic nitrogen compounds, Photochemistry), (*Photochemistry, Organic nitrogen compounds), (*Free radicals, Reaction kinetics), Decomposition, Disproportionation, Recombination reactions, Aliphatic compounds, Gases, Separation, Chromatographic analysis, Lighting equipment.

The objective of the work was to develop a technique for studying the relative rates of disproportionation and combination of unlike radicals and the first system studied was ethyl - propyl. To obtain this value it was necessary to reinvestigate the rates of disproportionation and combination of ethyl and propyl radicals under high intensity conditions. The ratios were found to be constant with pressure for azo ethane and azo propane photolysis. These ratios are 0.138 ± 0.009 for ethyl and 0.142 ± 0.015 for propyl radicals. The cross disproportionation to combination ratios were found to be 0.045 ± 0.012 for ethylene + propane and 0.049 ± 0.016 for ethane + propylene. In addition to the ratios of rate constants, the quantum yields of decomposition were studied as a function of pressure of the azo compounds. Based on the analytical results and the quantum yields, reaction mechanisms for the decomposition of the azo compounds under high intensity conditions were postulated. (Author)

AD-603 684 Div. 4
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
SYNTHESIS OF CYCLOALKANONE ALKYLHYDRAZONES AND FACTORS INFLUENCING ISOMERIZATION TO CYCLOALKANE AZO ALKANES.
Master's thesis,
by John Joseph Scheloske. May 64, 109p
AFIT GNE/Phys/64 15

Unclassified report

Descriptors: (*Hydrazones, Synthesis (Chemistry)), (*Organic nitrogen compounds, Chemical equilibrium), Molecular isomerism, Chemical bonds, Cyclohexanones, Physical properties, Boiling, Refractive index, Spectra (Infrared), Spectra (Visible and Ultraviolet), Absorption spectrum.

A chemical equilibrium has been indicated to exist between cycloalkanone alkylhydrazones and cycloalkane azo alkanes. One factor, bond angle strain, was proposed to have an effect on the equilibrium composition of the hydrazone-azo isomers. Consequently, cyclic compounds which had various internal bond angles were used in this investigation. The results of this study indicate that the effect of bond angle strain indeed is a factor in the percentage of hydrazone contained in the equilibrated samples of originally pure azoalkanes. The cycloalkanone alkylhydrazones were synthesized by the condensation reaction of cyclopentanone, cyclohexanone, cycloheptanone, and cyclooctanone with methylhydrazine. The hydrazones were refluxed over KOH to isomerize to the corresponding cycloalkane azo alkanes. The physical properties reported include boiling point, refractive index, infra-red absorption spectra, and ultra-violet absorption spectra. The equilibrium composition was determined with the use of ultra-violet spectroanalyses. (Author)

AD-603 728 Div. 4
OTS Prices: HC $5.00/MF $1.00

Massachusetts Inst. of Tech., Cambridge.
STUDY OF THE PHOTOCATALYZED DECOMPOSITION OF WATER AND OF THE MECHANISMS OF INTRAMOLECULAR ELECTRON TRANSFER IN ORGANIC COMPOUNDS.
Final rept.,
by Lawrence J. Heidt. 14 May 64, 162p
Contract AF19 604 5712, Proj. 6694, Task 669401
AFCRL 64 431

Unclassified report

Descriptors: (*Photochemistry, Water), (*Water, Decomposition), (*Atomic energy levels, Organic compounds), Catalysts, Iron compounds, Sulfates, Sulfuric acid, Hydrogen, Oxygen, Aromatic compounds, Amines, Aldehydes, Carboxylic acids, Nitrobenzenes, Solvents, Ultraviolet spectroscopy, Absorption spectrum, Molecular structure, Chemical bonds.

Gross and net quantum yield measurements were made for the photochemical conversion by light of 2537 A of up to 1.4% of the ferrous to ferric sulfate and of the accompanying production of gaseous H2 in aqueous H2SO4 at 25C. The data support the hypothesis that in solution 2M or less in dilute H2SO4, FeSO4 exists mostly as ion pairs which in 6.0 M H2SO4 are partly replaced by contact type FeSO4 complexes. The ultraviolet absorption spectra of aniline, nitrobenzene, benzaldehyde and benzoic acid were correlated with each other and with that of benzene. The shifts in the various absorption maxima brought about by solvents of different hydrogen bounding capability and dipole moment were found to follow a simple linear relationship. Molecular orbital calculations are presented which explain the ultraviolet absorption spectra of aniline, N-methyl-, N-ethyl-, N, N dimethyl- and N, N diethylaniline. The calculations reveal that the ground and six lowest excited electronic energy levels of these compounds are mixtures of electronic configurations contributed by the benzene group and by charge transfer from the amino to the phenyl group.

AD-603 735 Div. 4
OTS Prices: HC $4.00/MF $0.75

Stanford Univ., Calif.
CHEMICAL APPLICATIONS OF NUCLEAR MAGNETIC RESONANCE.
Final rept.,
by Richard Andrew Ogg, Jr., and James D. Ray.
20 Aug 62, 102p
Contract AF49 638 286

region 425-500 millimicrons was observed for Silanes I, II, and III. Mean lifetimes of 2.5 seconds for Silane I, and 2.0 seconds for Silanes II and III were calculated. (Author)

AD-603 620 Div. 4, 9
OTS Prices: HC $1.25/MF $0.50

Rocket Research Lab., Ohio State Univ., Columbus.
THE CONSTANT PRESSURE DECOMPOSITION OF NITROUS OXIDE, N2O + .88N2 AND N2O + AIR MIXTURES AT 11.2 ATMOSPHERES AND INITIAL TEMPERATURES FROM 772 TO 1233K.
Interim technical documentary rept.,
by J. R. Nicholson, E. S. Fishburne, and R. Edse.
Jun 64, 54p
Contract AF33 657 8951, Proj. 7065, Task 706501
ARL 64 107

Unclassified report

Descriptors: (*Nitrogen compounds, Oxides), (*Pyrolysis, Nitrogen compounds), Nitrogen, Air, Decomposition, Reaction kinetics, Chromatographic analysis, Absorption spectrum, Gas flow, Atmosphere entry, Hypersonic wind tunnels.

The thermal decomposition of N2O, N2O + .88N2, and N2O + air was investigated in a flowing system. These studies were conducted at 11.2 atmospheres over the temperature range from 772K to 1233K, and total flow rates from 1.0 to 3.76 liters/sec. Total residence times in the heated section range from approximately .1 to 2.5 sec. A maximum reacted gas temperature of 1588K was obtained. Chromatographic analysis of the products of decomposition showed that the maximum nitrogen dioxide yield was 4.44% for the N2O + air mixture, 5.09% for the N20 + .88N2, mixture, 7.55% for the pure N2O decomposition. Spectrographic observations of the emitted radiation from the decomposition reactions showed the presence of nitrogen dioxide in the reaction. Nitrogen dioxide absorption bands were found. There was no evidence of any discrete bands in emission. (Author)

AD-603 636 Div. 4
OTS Prices: HC $2.00/MF $0.50

Noyes Chemical Lab., Univ. of Illinois, Urbana.
ELECTRON COUPLING OF NUCLEAR SPINS. VIII. TEMPERATURE DEPENDENCE OF JFF IN 2-FLUOROBENZOTRIFLUORIDES.
Technical rept. no. 73,
by J. Jonas and H. S. Gutowsky. 27 Jul 64, 31p
Contract Nonr1834 13, Proj. NR051 215

Unclassified report

Descriptors: (*Fluorine compounds, Halogenated hydrocarbons), (*Halogenated hydrocarbons, Nuclear spins), (*Nuclear spins, Halogenated halocarbons), Aromatic compounds, Fluorides, Atomic orbitals, Molecular isomerism, Thermochemistry, Chlorides, Iodides, Protons, Nuclear magnetic resonance.

The F-F coupling constant between the CF3 group and the fluorine atom at the 2-position was measured and found to have an appreciable temperature dependence in several 2-F, 6-X-benzotrifluorides. The magnitude of the coupling constant and the direction of its change with temperature is consistent with the existence of two different rotational conformations of the CF3 group, whose relative stability depends upon the balance of repulsive steric interactions between the CF3 group and the 2- and 6-substituents. These results were supported and extended by measurements of the fluorine chemical shifts for the CF3 and 2-F, both of which move downfield with increasing temperature. An approximate analysis of the temperature dependence of the coupling constant indicates that the energy shift is about 1 kcal for X = H, Cl, and I; however, the stable orientation of the CF3 group is rotated by 60 degrees in the 6-Cl and 6-I derivatives from that in the 6-H. Values are reported for the long range F-F and F-H coupling between the CF3 group and fluorines and protons at the meta and para positions in several benzotrifluorides.

AD-603 653 Div. 4
OTS Prices: HC $1.00/MF $0.50

Dow Chemical Co., Midland, Mich.
OBSERVATION AND KINETIC INVESTIGATION OF THE NF AND NF2 RADICALS.
Technical rept.,
by R. W. Diesen. 27 Jul 64, 6p AR-1S-64
Contract Nonr3814 00

Unclassified report

Descriptors: (*Nitrogen compounds, Fluorides), (*Free radicals, Chemical reactions), Decomposition, Reaction kinetics, Shock tubes, Thermochemistry.

The NF2 radical (along with NF, F, and N2) was obtained from very dilute N2F4 by high-temperature (2200-3000K) shock-tube methods. The mechanism and kinetics of the decomposition of the radical were determined.

AD-603 662 Div. 4, 14, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THERMODYNAMIC FUNCTIONS OF HAFNIUM HALIDES,
by A. M. Aleksandrovskaya, I. I. Godnev, and A. S. Sverdlin. 9 Jul 64, 7p
FTD TT64 457; TT 64 71187

Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Khimiya i Khimicheskaya Tekhnologiya (USSR) 1963, v. 6, no. 1, p. 165-166.

Descriptors: (*Hafnium compounds, Halides), (*Refractory materials, Thermodynamics), Bromides, Chlorides, Iodides, Chemical bonds, Thermal properties, Enthalpy, Specific heat, Entropy, Functions, USSR.

The molecular heat capacities, entropies, referred isobar-isothermic potentials, and referred enthalpies are given for HfC14, HfBr4, and HfI4 at 298.2K and at 100-degree intervals between 300 and 1500K. The calculations were based on the normal oscillation frequencies and interatomic intervals of the compounds in question.

AD-603 678 Div. 4
OTS Prices: HC $6.00/MF $1.25

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN INFRARED STUDY OF THE EFFECT OF SOLVENT ON THE Si-H STRETCHING VIBRATION.
Master's thesis,
by William A. Swansiger. May 64, 231p
AFIT GNE/Phys/64 17

Unclassified report

We regret that legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Silanes, Chemical Bonds), Infrared spectroscopy, Absorption spectrum, Organic solvents,

AD-604 051 Div. 4
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
THE INFRARED SPECTRA OF PERFLUOROCYCLOPROPANE AND CIS- AND TRANS-PERFLUOROBUTENE-2,
by Julian Heicklen, Francis Wachi, and Vester Knight.
24 Jul 64, 26p TDR-269(4240-20)-5
Contract AF04 695 269
SSD TDR64 144

Unclassified report

Descriptors: (*Halogenated hydrocarbons, Spectra (Infrared)), (*Fluorine compounds, Halogenated hydrocarbons), Fluorides, Infrared spectroscopy, Molecular isomerisn, Chemical bonds.

The infrared spectra in the NaCl region of cC3F6, cis-C4F8(-2), and trans-C4F8(-2) are reported. Partial vibration assignments are discussed. (Author)

AD-604 106 Div. 4
OTS Prices: HC $1.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
C2F2,
by Julian Heicklen and Vester Knight. 31 Jul 64,
6p TDR-269(4240-20)-6
Contract AF04 695 269
SSD TDR64 153

Unclassified report

Descriptors: (*Halogenated hydrocarbons, Chemistry), (*Fluorine compounds, Halogenated hydrocarbons), Fluorides, Synthesis (Chemistry), Photochemistry, Pyrolysis, Purification, Spectra (Infrared).

The preparation, purification, and infrared spectra of difluoroacetylene are reported. (Author)

AD-604 108 Div. 4
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
DIFFUSION AND HETEROGENEOUS REACTION. VI. SURFACE RECOMBINATION IN THE PRESENCE OF DISTRIBUTED ATOM SOURCES.
Technical rept.
by Henry Wise, Clarence M. Ablow, and
Kenneth M. Sancier. Aug 64, 22p SRI-19-P
Contract Nonr3623 00, Proj. NR098 038

Unclassified report

Rept. on Proj. Squid

Descriptors: (*Catalysis, Reaction kinetics), (*Water vapor, Reaction kinetics), Recombination reactions, Mathematical models, Containers, Surfaces, Hydroxides, Hydrogen, Nuclear magnetic reasonance, Diffusion, Electric discharges, pH.

A theoretical analysis is made of the simultaneous removal of atoms by a first-order, heterogeneous reaction and their generation by a second-order, gas-phase reaction. Such a model is found applicable to a system in which hydrogen atoms recombine on the walls of a cylindrical vessel in the presence of hydroxyl radicals which may interact in the gas by reaction with hydrogen molecules. The perturbation of the hydrogen-atom concentration profile in the cylinder due to OH as measured by electron spin resonance spectroscopy is employed to calculate the rate constant for the gas-phase reaction OH + H2 yields H2O + H. (Author)

AD-604 113 Div. 4, 25
OTS Prices: HC $3.00/MF $0.75

Ultrasonics Research lab., Western Reserve Univ., Cleveland, Ohio.
STUDIES OF RELAXATION EFFECTS IN ELECTROLYTIC SOLUTIONS WITH THE PRESSURE-STEP METHOD.
Technical rept. no. 27,
by Heinz Hoffmann, John Stuehr, and Ernest Yeager.
15 Jun 64, 63p
Contract Nonr1439 04, Proj. NR384 305

Unclassified report

Descriptors: (*Electrolytes, Relaxation time), (*Complex compounds, Reaction kinetics), Dissociation, Chemical equilibrium, Measurement, Laboratory equipment, Ultrasonic radiation, Beryllium compounds, Sulfates, Nickel compounds, Glycols, Acetates, Pressure.

A pressure-step apparatus is described which permits the measurement of relaxation times of chemical processes involving ionic equilibria. The method involves the sudden release of an applied static pressure on an electrolytic solution. After the pressure release, the re-establishment of equilibrium between free hydrated ions and associated species is followed by means of conductance measurements. The relaxation time is observed directly from a display of the conductance changes on an oscilloscope screen. Relaxation times longer than 20 micro-sec can be measured with this apparatus. The method was applied to the study of complex formation between polyvalent cations and various ligands (e.g., sulfate, malonate, glycollate, glycinate, acetate). Relaxation times ranging from about 100 micro-sec to several seconds were measured. For BeSO4, the dependence of the relaxation time upon temperature and solvent deuteration as well as pH and concentration was determined. Rate constants for the formation of inner sphere coordination complexes for nickel malonate and beryllium sulfate were determined. (Author)

AD-604 117 Div. 4
OTS Prices: HC $1.00/MF $0.50

Case Inst. of Tech., Cleveland, Ohio.
SOME GERMANIUM MACROCYCLIC COMPLEXES.
Technical rept. no. 1,
by John N. Esposito, Laurel E. Sutton, and
Malcolm E. Kenney. 6 Aug 64, 14p
Contracts Nonr1141 18, AF49 638 773, Proj. NR356 454

Unclassified report

Descriptors: (*Complex compounds, Germanium compounds), (*Germanium compounds, Metalorganic compounds), (*Phthalocyanines, Germanium compounds), (*Porphyrins, Germanium compounds), Polycylic compounds, Pyridines, Synthesis (Chemistry), Spectra (Infrared), Molecular structure, Chemical bonds.

The macrocylic germanium complexes, hpGeF2, hpGeCl2, hpGeBr2, hpGe(OH)2, (hpGeO)x, hpGe(OC4H9-n)2, hpGe(OC6H5)2, PcGeF2, PcGeBr2, and PcGeI2 are reported together with additional data on hpH2, PcGeCl2 and (PcGeO)x. A comparison is made of the low frequency infrared spectra of the oxy, hydroxy and halo complexes. Evidence is given which indicates that (hpGeO)x is similar in structure to (PcGeO)x. (Hp=hemiporphyrazine; Pc=phthalocyanine). (Author)

AD-604 118 Div. 4
OTS Prices: HC $1.00/MF $0.50

Case Inst. of Tech., Cleveland, Ohio.

AFOSR 3473

Unclassified report

Compilation of the written records of R. A. Ogg, deceased 18 Jun 62.

Descriptors: (*Nuclear magnetic resonance, Chemistry), (*Nitrogen compounds, Nuclear magnetic resonance), Spectrum analyzers, Hydrogen, Nitrogen, Fluorine, Heat exchangers, Nuclear spins, Sodium compounds, Nitrites, Synthesis (Chemistry), Reaction kinetics, Molecular isomerism, Nitric acid, Amides, Molecular structure.

Contents: Technical status report no. 1, May 31, 1958; Trip report, May 11, 1959; Renewal proposal, Feb. 19 1960; Operating report, June 29, 1961; Miniature glass heat exchanger for the microsecond range; Interazione magnetica spin-spin nello spettro a risonance nucleari magnetiche del formiato butilico terziario; Hyponitrite, alpha-oxyhyponitrite and nitroxite: structures and reactions; Ambiguities in inorganic nitrogen chemistry; Heat of isomerization of peroxynitrite to nitrate and kinetics of isomerization of peroxynitrous acid to nitric acid; A new rapid synthesis of sodium hyponitrite; Structural studies on several nitrogen compounds by N14 NMR; Nuclear magnetic resonance studies of amides; Electronic structure and molecular asymetry; A tribute to Richard Andrew Ogg, Jr., given in the Memorial Church at Stanford University, June 29, 1962.

AD-603 756 Div. 4, 17
OTS Prices: HC $1.00/MF $0.50

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF ANALYTICAL TECHNIQUES FOR THE DETERMINATION OF MINUTE QUANTITIES OF SELECTED ELEMENTS IN BERYLLIUM.
Interim rept. no. 2, 20 Mar-20 May 64,
by W. M. Henry. 24 Jun 64, 22p
Contract NOw64 0081c

Unclassified report

Descriptors: (*Beryllium, Chemical analysis), Mass spectroscopy, Microanalysis, Gases, Oils, Contamination, Electrodes, Cleaning, Helium, Oxygen.

Investigations were made to evaluate, especially in respect to trace-gas impurities, different methods of cleaning sample electrodes, of loading into the mass spectrograph, and of baking prior to mass-spectrographic analysis. Conclusions on the effectiveness of the various procedures are tentative; a more accurate readout of the spectra will be made by using a recording microphotometer. (Author)

AD-603 782 Div. 4
OTS Prices: HC $2.00/MF $0.50

Space General Corp., El Monte, Calif.
CORRELATION OF CHEMICAL SHIFT AND SPIN COUPLING VALUES IN THE B(11) N. M. R. SPECTRA OF BORON COMPOUNDS.
Technical rept. no. 1,
by Robert E. Williams, Kenneth M. Harmon, and John R. Spielman. 1 Jul 64, 28p
Contracts Nonr4381 00, Nonr 3364 00,
Projs. NR356 461, NR052 427

Unclassified report

Prepared in cooperation with California State Coll., Los Angeles and Harvey Mudd Coll., Claremont, Calif.

Descriptors: (*Boron compounds, Nuclear magnetic resonance), Borohydrides, Organoboranes, Nuclear spins, Chemical bonds, Hydrogen, Fluorine, Chemical equilibrium, Halides, Atomic orbitals.

Enough data have now been accumulated and empirically correlated that fairly accurate predictions may be made as to the chemical shift values of the boron-11 nucleus and boron-hydrogen spin-coupling values of triligand and tetraligand boron compounds. Boron-fluorine spin coupling is discussed. Triligand and tetraligand boron compounds differ, in several cases, in the direction of chemical shift change upon substitution of hydrogen by another element; structural identification is thus allowed. B-H spin coupling in the carboranes and boron hydrides is discussed. Where practicable B(11)-H, C(13)-H, and B(11)-F, C(13)-F spin coupling values are compared. Delta and J values of mixed boron trihalides are given as are the values of BH3CO and BH3PF3. (Author)

AD-603 795 Div. 4, 10
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A SIMPLIFIED METHOD FOR COMPUTING THE EQUILIBRIUM COMPOSITION OF GASEOUS SYSTEMS,
by F. J. Krieger and W. B. White. Rev. 9 Jan 48,
10p P-2

Unclassified report

Descriptors: (*Chemical equilibrium, Gases), (*Combustion, Chemical equilibrium), Fuels, Oxidizers, Vapors, Dissociation, Thermochemistry, Functions, Equations, Iterative methods.

A simplified procedure is described for computing, either manually or by means of punched cards, the equilibrium composition of a gaseous system of any degree of complexity. The method presents a system of n equations in n unknowns in such a form that each of the major components is given as a linear expression of the minor components only, while the logarithm of each of the minor components is given as a linear expression in terms of the free energy change for the dissociation reaction which defines the minor component and the logarithms of the major components and the total pressure. An iteration process then gives an exact solution with a rapidity which decreases as the fuel-oxidant mole ratio approaches the stoichiometric value. (Author)

AD-603 978 Div. 4, 25
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
SPECTRA AND ENERGY LEVELS OF Eu(3+) IN Y2O3.
Semiannual rept. for 1 Jul-31 Dec 63,
by N. C. Chang and J. B. Gruber. 13 Jul 64, 31p
TDR-269(4250-25)-1
Contract AF04 695 269
SSD TDR64 113

Unclassified report

Prepared in cooperation with California Univ., Los Angeles.

Descriptors: (*Europium, Atomic properties), (*Yttrium compounds, Oxides), Impurities, Ions, Absorption spectrum, Fluorescence, Atomic energy levels.

The absorption and fluorescence spectra of Eu(3+) in single crystals of Y2O3 were observed and analyzed. The intermediate-coupling free-ion energy levels for Eu(3+), including the effects of the 46 singlet states, are presented for all levels appearing below 41,000 cm(-1). The results obtained by including the singlet states in the free-ion energy level calculations are discussed. (Author)

5. Communications

AD-603 550 Div. 5, 8
OTS Prices: HC $7.00/MF $1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NOISE IMMUNITY OF TELEVISION SYSTEMS RANDOM NOISE IN TELEVISION,
by N. N. Krasil'nikov. 17 Jun 64, 315p
FTD TT62 1661; TT 64 71184

Unclassified report

Unedited rough draft trans. of mono. Pomekhoustoichivost' Televizionnykh Ustroistv Flyuktuatsionnye Shumy v Televidenii, Moscow/Leningrad, 1961, 267p.

Descriptors: (*Television communication systems, Noise (Radio)), (*Signal-to-noise ratio, Video signals), (*Video signals, Signal-to-noise ratio), Preamplifiers, Cathode ray tubes, Television equipment, Circuits, Electron tubes, Visibility, Measurement, Probability, Equations, Statistical functions, USSR.

The book examines the problems of the occurrence of random noise in television systems and its passage through the amplification channel. On the basis of the statistical structure of the signal and the noise, as well as of the basic parameters of the television system, there is developed an expression for the noisiness of the picture with the aid of which it is possible to uniquely determine the visibility of noise in the picture. The book examines the effect of noise on the observability of small details in the picture and particularly the effect on the resolution of the television system. It is intended for engineers working in the field of television and radar who are acquainted with the basic tenets of probability theory. (Author)

AD-603 622 Div. 5, 8, 25
OTS Prices: HC $7.00/MF $1.50

Technical Research Group, Melville, N. Y.
HETERODYNE DETECTION IN OPTICAL COMMUNICATION.
Final rept.,
by S. F. Jacobs, J. T. LaTourrette, G. Gould, and P. Rabinowitz. Jul 64, 307p
Contract AF30 602 2591, Proj. 4519, Task 451905
RADC TDR64 130

Unclassified report

Descriptors: (*Light communication systems, Modulation), (*Modulation, Light communication systems), Lasers, Interferometers, Mixers (Electronic), Signal-to-noise ratio, Noise (Radio), Light transmission, Reflectors, Broadband, Amplifiers, Optics, Measurement, Theory, Equations.

The properties of optical heterodyne detection are analyzed and measured, using a laser and Twyman-Green interferometer. It is shown that heterodyne amplification preserves the signal-to-noise ratio in the detected difference frequency in the presence of incoherent noise and that the limiting noise of the system is photocurrent shot noise. Suitability of this technique is demonstrated for diffuse as well as specular mirrors and corner reflectors as well as flats. Various techniques of modulation are discussed and demonstrated, including phase, amplitude and single-sideband modulation. A method is developed for the demodulation of phase-modulated light. The limitations imposed on the optical heterodyne technique by the transmission path conditions are investigated. Single-sideband vs double-detection techniques are compared experimentally, under turbulent atmospheric conditions. The former proves to be the superior technique. Design and construction of a field instrument embodying this principle is initiated. The uses and limitations of heterodyne detection in optical communications, demultiplexing of channels, demodulation of FM and AM, Doppler and displacement measurements, and laser stabilization are discussed. Recommendations are made for future research and development. (Author)

AD-603 624 Div. 5, 8
OTS Prices: HC $3.00/MF $0.75

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
STUDY AND INVESTIGATION OF POLARIZATION PROGRAMMING. VOLUME II: POLARIZATION SYSTEMS ANALYSIS.
Final rept.,
by R. S. Berkowitz, J. Choder, R. G. Mulholland, and P. Hahn. Aug 64, 62p MSEE-64-16
Contract AF30 602 3105, Proj. 4540, Task 454003
RADC TDR64 258 V2

Unclassified report

Prepared in cooperation with American Electronic Labs., Inc., Colmar, Pa.

Descriptors: (*Polarization, Electromagnetic waves), (*Communication systems, Signal-to-noise ratio), (*Radio interference, Communication theory), Propagation, Signals, Statistical processes, Antennas, Equations, Feedback.

Three systems are proposed for utilization of polarization programming in a ground-to-ground, over-the-horizon, tropospheric-scatter-propagation communications link. These are instantaneous polarization programming, orthogonal-mode polarization programming, and rapid polarization programming. It is shown that all three systems are theoretically feasible and can lead to significant increases in signal-to-interference ratios achievable. A detailed description and evaluation of each system is presented, based on the assumptions of slowly varying polarization of an interfering signal and non-depolarization of desired signal by the propagation medium. Comparisons are presented of the relative utility of the three systems as well as their relation to present communication systems. Conclusions and recommendations for further study are presented. (Author)

AD-603 850 Div. 5, 8, 18, 30
OTS Prices: HC $3.00/MF $0.75

International Electric Corp., Paramus, N. J.
TEST REPORT FOR CATEGORY I ON-SITE ACCEPTANCE AND INTEGRATION TESTING OF THE DIGITAL DATA TRANSFER SYSTEM SUBSCRIBER A (AN/FYQ-3) WITH THE REMOTE COMMUNICATIONS CENTRAL (AN/FYQ-4) AND THE ELECTRONIC DATA TRANSMISSION COMMUNICATIONS CENTRAL (AN/FYQ-5).
8 May 64, 64p
Contract AF19 626 8
ESD TDR64 388

Unclassified report

Descriptors: (*Command and control systems, Strategic Air Command), (*Data transmission systems, Strategic Air Command), (*Strategic Air Command, Data transmission systems), Tests, Test methods, Air Force, Digital computers, Digital recording systems, Teletype systems, Cryptography, Electronic equipment, Voice communication systems, Specifications, Automatic, Reliability (Electronics).

The report describes the official Air Force regulations

DICHLORO(PHTHALOCYANINO)SILICON.
Technical rept. no. 2,
by Michael K. Lowery, Albert J. Starshak, John N. Esposito, Paul C. Krueger, and Malcolm E. Kenney. 14 Aug 64, 5p
Contracts Nonr1141 18, AF49 638 773, Proj. NR356 454
Unclassified report

Descriptors: (*Silicon compounds, Phthalocyanines), (*Phthalocyanines, Silicon compounds), Silanes, Chlorides, Purification, Recrystallization, Hydrolysis, Alcohols.

Two convenient syntheses for PcSiCl2 are reported which are based on the use of o-cyanobenzamide and 1, 3-di-iminoisoindoline. In addition techniques are given for the recrystallization of this dichloride and for its facile conversion to PcSi(OH)2. (Author)

AD-604 185 Div. 4
OTS Prices: HC $1.00/MF $0.50

Tulane Univ., New Orleans, La.
REFLECTANCE SPECTRA AND THE COORDINATION OF DIVALENT METAL IONS IN 5-TRIFLUOROMETHYLTETRAZOLE COMPLEXES.
Addendum to Final status rept. no. 9,
by Arlo D. Harris, Hans B. Jonassen, and Ronald D. Archer. 29 Jul 64, 14p
Contract Nonr47509, Proj. NR052 424
Unclassified report

Descriptors: (*Complex compounds, Molecular structure), (*N-hetercyclic compounds, Complex compounds), Fluorine compounds, Metalorganic compounds, Pyrroles, Iron compounds, Cobalt compounds, Nickel compounds, Copper compounds, Hydrates, Reflection, Spectroscopy, Chemical bonds.

The nature of the coordination of Fe(II), Co(II), Ni(II), and Cu(II) with the 5-trifluoromethyltetrazolyl anion was ascertained on the basis of a correlation of the reflectance spectra with previously reported observations (see AD-603 081). All of the complexes appear to be octahedral or distorted octahedral sigma-bonded complexes involving coordination by the tetrazolyl anion and water. (Author)

AD-604 263 Div. 4
OTS Prices: HC $1.00/MF $0.50

Wisconsin Univ., Madison.
CATALYST SELECTION: AN APPLICATION OF GROUP SCREENING.
Technical rept. no. 27,
by William G. Hunter and Reiji Mezaki. 1964, 9p
Contract Nonr1202 17, Proj. NR042 222
Unclassified report

Descriptors: (*Catalysts, Selection), (*Methane, Oxidation), Optimization, Statistical tests, Carbon dioxide, Water vapor.

The conventional procedure for catalyst selection, which is often a rather expensive process, is to test each catalyst individually. The purpose of this note is to point out that here is an area ideally suited for the application of group screening. In this method, factors are initially tested in groups and then those groups which appear to contain the most effective factors are studied further. Experimental results from a screening study on catalysts for the oxidation of methane indicate that considerable savings are possible. In this investigation fourteen commercially available catalysts were screened in essentially seven runs. (Author)

AD-604 268 Div. 4, 7
OTS Prices: HC $5.00/MF $1.00

Electrochemistry Research Lab., Western Reserve Univ., Cleveland, Ohio.
KINETIC STUDIES OF THE HYDROGEN ELECTRODE WITH THE ROTATING DISK TECHNIQUE.
Technical rept. no. 19,
by M. P. Makowski, Ewald Heitz, and Ernest Yeager.
15 Jul 64, 151p
Contract Nonr2391 00, Proj. NR359 277
Unclassified report

Descriptors: (*Fuel cells, Electrodes), (*Hydrogen, Electrochemistry), Oxidation, Reaction kinetics, Platinum, Disks, Polarization, Voltage, Electrolytes, Sulfuric acid, Perchloric acid, Hydrogen compounds, Bromides, Dissociation, Adsorption.

The work was undertaken to elucidate some aspects of the anodic oxidation of hydrogen on a rotating platinum disk electrode under conditions which allowed polarization studies at atmospheric and elevated pressures up to 60 atm. Solutions of 1 N HBr, H2SO4, and HC104 were used. All anodic polarization curves showed characteristic current density maxima or flat portions. The position of the maxima with respect to the overpotential coordinate was found to depend on the pre-treatment of the electrode, on the potentiostatic scan rate, and to some extent on the angular velocity of the disk. The data in all experiments with 1 N HBr and in most tests with 1 N H2SO4 showed upon treatment by the rotating disk-reaction order method that the anodic hydrogen reaction on platinum in these media is first order with respect to concentration of hydrogen. A mathematical treatment based on simultaneous control by the dissociative-adsorptive charge transfer (H yields H+ + e-) steps was developed.

Bowman. Jun 64, 12p
Proj. 1G622001A05601-14
USAEL TR2469

Unclassified report

Descriptors: (*Voice communication systems, Indicator lights), (*Trigger circuits, Indicator lights), (*Monitors, Voice communication system), Radio signals, Timing circuits, Sensitivity, Amplifiers, Switching circuits, Delay circuits, Relays, Diodes (Semiconductor), Transistors.

This report describes the design and operation of an indicating circuit developed for use in a Fire Support and Coordination Center. The main function of the circuit is to provide a means of indicating when a particular voice channel of a receiver is in operation. (Author)

testing and presents the pertinent test data, results, conclusions, and recommendations relevant to the integration of the Elkhorn, Nebraska, Digital Data Transfer System Subscriber A (TSA), AN/FYQ-3, with its Remote Communications Central (RCC) at Offutt Air Force Base, and its integration with its RCC and the SAC Headquarters Electronic Data Transmission Communications Central (EDTCC). Included is a brief historical summary of TSA emplacement, installation and equipment debug activities as well as a detailed engineering analysis of the problems encountered during integration testing and their resolution. It is intended that the events, problems and solutions reported in this document be considered objectively as guidance for future implementations of such equipments.

AD-603 865 Div. 5, 1, 8, 12, 19
OTS Prices: HC $4.00/MF $0.75

Institute of Science and Tech., Univ. of Michigan, Ann Arbor.
SURVEY AND ANALYSIS OF LONG-DISTANCE COMMUNICATION TECHNIQUES.
Final rept.,
by George W. McClure and John C. Duté. May 64, 126p IST 4987-15-F
Contract ARDS487, Proj. 113 10 1R
FAA RD 64 7

Unclassified report

Descriptors: (*Communication satellites (Active), Air traffic control systems), (*Air traffic control systems, Communication systems), Radio communication systems, Atlantic Ocean, Synchronous satellites, Aviation safety, Very high frequency, High frequency, Data transmission systems, Digital computers, Radio transmission, Antennas, Voice communication systems, Noise (Radio), Economics, Air traffic.

Various means of providing a reliable communication system for air traffic control (ATC) in the North Atlantic in the 1970's was investigated. The study indicated that considerable improvement in the adequacy and reliability of communication with over-ocean aircraft (during the interim period before 1970) could be obtained by the adoption of an optimized hybrid system utilizing High Frequencies (in both ground wave and ionospheric modes); Very High Frequencies (present communication band in both line-of-sight and tropospheric scatter modes); and Low Frequencies (ground-to-air). However, the study also indicated that the only economically and operationally feasible technique which will fully satisfy the near-future requirements for communication to over-ocean aircraft and which will be at all adequate for post-1970 requirements, is one which utilizes active satellite relays. The study further indicated that, for the communication function alone, synchronous (or 24-hour period) satellite orbits are superior to other orbits when economics and operational procedures are considered. This system, which provides the necessary area coverage and access time at a reasonable cost, also protects the large capital investment of the airline operators in VHF communications equipment. (Author)

AD-604 095 Div. 5, 7, 15
OTS Prices: HC $3.00/MF $0.50

Coordinated Science Lab., Univ. of Illinois, Urbana.
PRINCIPLES AND APPLICATIONS OF UNISTOR GRAPHS,
by George G. Dodd. Jul 64, 52p, CSL-R-217
Contract DA28 043AMC00073E

Unclassified report

Partly supported by the Office of Naval Research and the Department of the Air Force Office of Scientific Research.

Descriptors: (*Networks, Topology), (*Graphics, Networks), Communication systems, Statistical analysis, Circuits, Voltage, Simultaneous equations, Matrix algebra, Linear systems.

New properties and applications of unistor graphs are presented. A technique for solving a set of linear equations is derived and an alternative graphical representation of an active network is given. Communication nets are treated for the first time by unistor graph techniques. A unistor is an oriented edge connecting two vertices in a graph. A flow exists in the oriented edge with a value equal to the product of the edge weight and the weight of the initial vertex. The unistor is characterized by flow, potential, admittance, and directedness-four properties also found in linear equations and electrical networks. It is shown that a unistor graph can represent a matrix and the determinant and cofactors can be evaluated by using directed trees and directed 2-trees. A technique is given for representing in a node-admittance form an active network by a unistor graph. This graph is then used to determine the values of the unknown voltages of the original circuit. A vertex potential for a communication net is defined and used to obtain upper and lower bounds on the maximum flow between two vertices of the net. (Author)

AD-604 248 Div. 5, 2
OTS Prices: HC $3.00/MF $0.75

Washington State Univ., Pullman.
POLAR HIGH FREQUENCY RADIO PROPAGATION STUDY.
Final rept. for 1 Mar 63-29 Feb 64,
by Lloyd B. Craine, David H. Schrader, Harold Hadaller and William A. Flatt. 30 Jun 64, 67p WSU-64/16-46
Contract AF19 628 2488, Proj. 4603, Task 460304
AFCRL 64 365

Unclassified report

Descriptors: (*Radio waves, Propagation), (*Ionospheric propagation, Polar regions), Radio signals, High frequency, Wave transmission, Pulse transmitters, Antennas, Ionospheric disturbances, Periodic variations, Antenna radiation patterns.

An 18 Mc radio propagation study was conducted using a pulse transmitter and rotating directional antenna at Thule, Greenland, and a fixed directional antenna and receiving system at Pullman, Washington. The 3930 km cis-polar path is perpendicular to the auroral zone, and the zone is about 60 per cent of the distance from Thule. The results showed that the daytime MOF was consistently higher than the CRPL predicted MUF calculated by Gilbert and Hanson especially for this path. Nighttime reception was observed for 10 to 20 per cent of the time during geophysically disturbed periods. The MOF was at least two times the predicted MUF for this reception. Propagation was primarily over the great circle path. However, considerable off-great-circle propagation, attributed either to ionospheric tilts or to higher off-circle MOF values, was observed. Long-delayed pulses, appearing when the antenna main lobe pattern was about ±90 degrees, were associated with sunrise-sunset effects. One clear example of forward round-the-world propagation was observed during the four months when data was available. (Author)

AD-604 271 Div. 5, 8, 25
OTS Prices: HC $1.00/MF $0.50

Army Electronics Lab., Fort Monmouth, N. J.
ULTRA-SENSITIVE VOICE TRANSMISSION INDICATING CIRCUIT,
by William F. Kiss, Russell A. Gilson, and Dennis

of army type radars, and initial investigations concerned with the performance of a measurement program to determine the correlation between in guide and radiated field measurements. (Author)

AD-603 769 Div. 6, 8
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
A BROADBAND LINEAR ARRAY FOR SPACE SURVEILLANCE.
Interim rept.,
by C. A. Bartholomew. 19 Jun 64, 24p
NRL 6107

Unclassified report

Descriptors: (*Biconical antennas, Design), (*Space surveillance systems, Continuous wave radar), Log periodic antennas, Broadband, Frequency, Antenna lobes, Transmission lines, Satellites (Artificial), Aluminum, Rods.

A broadband linear array with minimum side lobes was developed to meet several special requirements of the U.S. Navy Space Surveillance System. These requirements include simultaneous monitoring of a number of frequencies in the 100 to 500 Mc/s band for the early identification and separation of satellites launched in multiple sets. The constructed arrays are 5600 feet long, consisting of 1080 biconical aluminum-rod elements above a ground screen. The VSWR is less than 2:1 over the frequency range 100 to 500 Mc/s. An 'offset' harnessing technique was used to provide an amplitude distribution for minimum side lobes while maintaining the equal line lengths required for broadbanding. Good suppression of grating lobes exists to above 300 Mc/s. (Author)

AD-603 858 Div. 6, 8
OTS Prices: HC $3.00/MF $0.75

Naval Research Lab., Washington, D. C.
THE FOUR-FREQUENCY RADAR MASTER CONSOLE II,
by F. R. Fluhr. 10 Jul 64, 70p
Proj. RR008 01 41 5550
NRL 6059

Unclassified report

Descriptors: (*Radar equipment, Display systems), (*Display systems, Airborne), Propagation, Radar transmitters, Radar receivers, Cathode ray tubes, Vidio amplifiers, Relays, Transistors, Circuits, Wiring diagrams.

The completion of the master console for the airborne four-frequency radar system, to be used in NRL's wave-propagation studies, was assumed by NRL and was described previously (see AD-409 128). Four displays were incorporated into a single console, along with the transmitter, receiver, and antenna-drive control functions. Two cathode-ray tubes present the B and PPI scans, while a third presents dual traces representing linear A sweeps. The initial design required 1.2 kw at 400 cps, lacked adequate display linearities, and presented maintenance problems when installed aboard aircraft. The new console design uses transistor and vacuum-tube modular units. Power requirements were reduced to 1/4 of that used in the original console. Video-amplifier rise times of less than 35 nanoseconds were achieved using transistor circuits. Display distortion and defocusing were materially reduced, and all gain controls are linear. (Author)

AD-603 938 Div. 6, 12
OTS Prices: HC $8.35/MF $2.25

Industrial Nucleonics Corp., Columbus, Ohio.
MISSILE LIFT OFF MEASUREMENT SYSTEM.
Final rept.,
by A. J. Campanella, W. L. Adams, L. E. Beghian, A. B. Bishop, and L. C. Brown. Jun 64, 532p
Contract AF30 602 3123, Proj. 5930, Task 593004
RADC TDR63 535

Unclassified report

Descriptors: (*Guided missile tracking systems, Feasibility studies), (*Launching, Guided missiles), Tracking, Guided missile trajectories, Guided missile ranges, Gamma rays, Propagation, Photons, Measurement, Design.

A feasibility study and analysis has determined that a nucleonic tracking method can be used to provide a Missile Lift Off Measurement System for all-weather tracking of missiles at the AMR during the early lift off phase. During the first 500 ft. of flight, accuracies of 0.05 ft. in position, 0.02 ft. per second in velocity, and 0.01 ft. per second per second in acceleration can be achieved with postflight analysis of acquired data. Experiments were conducted to investigate the nucleonic tracking method, a system analysis was performed, and a recommended system design was synthesized. The study was undertaken because of two attractive characteristics of a gamma photon nuclear tracker, i.e., high penetrability and straight line propagation of primary gamma photons. These two characteristics are requisites for an all-weather high precision tracker. (Author)

AD-604 180 Div. 6, 8, 12
OTS Prices: HC $1.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
A STUDY OF OPTIMAL LINEAR ESTIMATION FOR A HORIZON SCANNER,
by James S. Meditch. 25 Aug 64, 20p
TDR-269(4540-70)-7
Contract AF04 695 269
SSD TDR64 147

Unclassified report

Descriptors: (*Horizon scanners, Simulation), (*Attitude indicators, Spacecraft), (*Space surveillance systems, Scanning), Pitch (Motion), Orbital trajectories, Noise, Optimization, Mathematical prediction, Linear systems, Guidance, Control systems, Analog computers.

The theory of optimal linear filtering is applied to the problem of estimating the pitch attitude of an orbiting spacecraft. The horizon scanner model assumed includes the effects of instrument dynamics, instrument noise, and external noise, such as that due to 'cold clouds' and uncertainty in the definition of the horizon. The entire system, including the process model and the optimal filter, is simulated on an analog computer, and the results are discussed and evaluated. (Author)

AD-604 186 Div. 6, 26
OTS Prices: HC $2.00/MF $0.50

Santa Barbara Research Center, Goleta, Calif.
PRODUCTION ENGINEERING MEASURE. PbSe INFRARED DETECTORS - TYPE IR-200.
Quarterly progress rept. no. 6, 1 Apr-1 Jul 64,
by G. H. Cook. 25 Aug 64, 48p SBRC-5527-Q6
Contract DA36 039AMC01466K

Unclassified report

Descriptors: (*Infrared detectors, Tests), Infrared equipment, Quality control, Production, Military requirements, Lead compounds, Selenides.

6. Detection

AD-603 541 Div. 6, 25
OTS Prices: HC $3.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
AIRBORNE SYSTEM FOR THE MEASUREMENT OF INFRARED MISSILE SPECTRA,
by J. M. Ellis, D. E. Matlack, H. A. Templin, and G. M. Black. 21 May 64, 51p
NOL TR64 56

Unclassified report

Descriptors: (*Guided missile detection, Infrared detectors), (*Infrared detectors, Guided missile detection), Guided missiles, Exhaust gases, Infrared radiation, Measurement, Airborne, Spectrum analyzers, Lead alloys, Selenium alloys, Indium alloys, Antimony alloys, Detectors, Data processing systems, Digital computers, Early warning systems.

An airborne spectrometer and tracker system for quantitative spectral measurements of ballistic missile plumes in the wavelength region from 1.0 to 5.0 microns is described. Measurements are made at an altitude of about 40,000 feet. Eight spectra per second are recorded with a wavelength resolution of the order of 0.1 micron. The system NEFD is about 3 x 10 to the minus 10th power and 4 x 10 to the minus 12th power watts/sq. cm with a PbSe and InSb detector respectively. Data are processed on an IBM 7090 computer and a Stromberg Carlson 4020 microfilm plotter. Sample plots of H lambda and H lambda R2 are given. (Author)

AD-603 590 Div. 6
OTS Prices: HC $2.00/MF $0.50

Technical Research Group, Melville, N. Y.
COMPARISON OF SEVERAL METHODS OF CALCULATING PISTON VELOCITIES OF AN ARRAY IN RECEPTION,
by Andrew Kane. Apr 64, 42p TRG-142-TN-64-7
Contract Nonr3208 00

Unclassified report

Descriptors: (*Sonar receivers, Acoustic impedance), (*Wave transmission, Velocity), (*Numerical analysis, Sonar signals), Matrix algebra, Iterative methods, Series, Conformal mapping, Programming (Computers).

A comparison is made among three methods of computing piston velocities of an array in reception. These methods are: (1) the exact solution, (2) a solution based on an original assumption of equal velocity magnitudes, and (3) an iterative solution. Numerical comparison among solutions is made for a linear array and a conformal array. (Author)

AD-603 598 Div. 6
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
THE EFFECT OF DIRECTION AND SPEED OF IMAGE MOTION UPON TARGET DETECTION WITH SIDE-LOOKING RADAR.
Rept. for Jan-Apr 64,
by Fen Rhodes and H. C. Self. Jun 64, 15p
Proj. 7184, Task 718404
AMRL TDR64 45

Unclassified report

Descriptors: (*Target recognition, Position finding), (*Radar images, Side-looking radar), (*Position finding, Targets), Navigator-bombardiers, Performance (Human), Plan position indicators, Velocity, Motion.

Sixteen navigator-bombardiers were required to find airfields, bridges, railroad yards, and tank farms on side-looking radar imagery when the imagery was moving either vertically, top to bottom; or horizontally, left to right. The imagery was presented at simulated aircraft speeds of either Mach 1 or Mach 2.8 on a 14 by 14 inch rear projection screen at a scale of 1:93, 900. The average distance that targets traveled on the screen before being detected was significantly less for the vertical condition. However, neither the number of targets detected nor the proportion of false targets reported was significantly influenced by the direction of image motion. More targets were detected and the average distance the target traveled before being detected was less at the slower speed. Image speed had no significant effect on the number of false targets reported. (Author)

AD-603 617 Div. 6, 12, 19
OTS Prices: HC $5.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
DESIGN OF A CONSTANT ATTITUDE TARGET FOR RENDEZVOUS WITH REMOTE MANEUVERING UNIT.
Master's thesis,
by Alan James Willoughby. Aug 64, 159p
AFIT GSP/Phys/64 14

Unclassified report

Descriptors: (*Rendezvous spacecraft, Remote control systems), (*Targets, Satellites (Artificial)), Rendezvous guidance, Rendezvous trajectories, Test methods, Atmosphere models, Perturbation theory, Heating, Rotation, Programming (Computers), Spacecraft, Attitude control systems, Design.

A target satellite is designed to provide a test of the Remote Maneuvering Unit's rendezvous, television and radar capabilities and meet certain requirements imposed by NASA. A Fortran program is developed to calculate target trajectories based on perturbation theory and an atmospheric model which considers oblateness, solar heating and rotation.

AD-603 639 Div. 6, 8
OTS Prices: HC $4.00/MF $0.75

IIT Research Inst., Chicago, Ill.
ELECTRONIC EQUIPMENT CHARACTERISTICS--RADAR TYPES.
Quarterly progress rept. no. 1, 15 Feb-15 May 64,
by J. J. Krstansky, I. N. Mindel, R. D. Standley, M. W. Scheldorf, and P. Toulios. 15 May 64, 125p
Contract DA28 043AMC00004E, Proj. 1G6 20501D449 01

Unclassified report

Descriptors: (*Radar interference, Measurement), Radar antennas, Waveguides, Antenna radiation patterns, Standing wave ratios, Radar reflections, Antenna feeds, Radar receivers, Radar transmitters, Noise (Radar), Radar tracking, Fire control systems components, Radar equipment, Test equipment (Electronics), Calibration.

The objectives of the program are to establish measurement procedures for defining interference characteristics of U. S. Army radar equipments. The areas of investigation considered include two approximate techniques for determining the mode purity of rectangular waveguide mode launchers, use of mode launchers as receivers, transmitter spectrum signature measurements using a pattern integration technique, advanced measurements techniques for determining the interference characteristics of tracking radars and including a survey

7. Electrical Equipment

AD-603 581 Div. 7
OTS Prices: HC $2.00/MF $0.50

Mallory Battery Co., North Tarrytown, N. Y.
TESTING AND EVALUATION OF PRIMARY ALKALINE CELLS AND BATTERIES,
Semi annual rept. no. 7, 31 Jul 63-31 Jan 64,
by Roger Goodman. 31 Jan 64, 34p
Contract DA36 039sc78320, Task 1G6 22001A053 02
Unclassified report

Descriptors: (*Alkaline cells, Electric discharges), (*Batteries and components, Alkaline cells), (*Storage batteries, Alkaline cells), Dry cells, Primary cells, Zinc, Mercury compounds, Oxides, Temperature, Tables, Tests, Storage, Voltage.

The testing and evaluation of primary alkaline cells and batteries of the zinc-alkaline-mercuric oxide system is discussed. Delayed discharge test results are presented for cell types 1R at 18 months, 12R at 36 months, 42R at 18 months, 625R at 18 months, 640R at 24 months, 650R at 6 months, 1438R at 12 months and 1450R at 18 months. Partial data is presented on discharge of cell type 42R at the 1000-hour rate after 36 months of storage. Monthly EMF readings were taken on the seven cell types remaining in the program. (Author)

AD-603 630 Div. 7
OTS Prices: HC $3.00/MF $0.50

New York State Coll. of Ceramics, Alfred Univ.
STUDY OF HYDROGEN-OXYGEN FUEL CELL ELECTRODES.
Rept. for Jan 62-Jun 64,
by T. J. Gray and R. B. Rozelle. Aug 64, 51p
Contract AF33 657 7564, Proj. 8173, Task 817303
APL TDR64 88
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fuel cells, Electrodes), (*Catalysts, Fuel cells), (*Electrolytes, Fuel cells), Hydrogen, Oxygen, Decomposition, Paladium, Platinum, Electroplating, Impregnation, Electrodeposition, Carbon, Nickel, Asbestos, Gels, Graphite, Oxides, Hydroxides, Metals, Potassium compounds, Cathodes (Electron tubes), Surface-active substances, Porous materials, Mercury compounds, Electric potential, Electrochemistry.

A number of different types of fuel cell systems, including catalysts, electrodes and electrolytes, have been investigated. Of the metals studied, it was found that a platinum-palladium, electrically co-deposited catalyst gave the best performance at both the hydrogen and oxygen electrodes. Supporting data from single electrode studies and galvanostatic measurements are given. Experimental methods of depositing the catalyst were also studied. Ultrasonic impregnation of the electrode with the electroplating solution before electrodeposition produced, by far, the best electrochemical performance. Both porous carbon and sintered nickel were used as catalyst supports. Free electrolytes, various types of gelled electrolytes, and electrolytes held in an asbestos matrix were investigated. Wetting or contact difficulties dictated the use of aqueous potassium hydroxide-asbestos electrolyte in the final cells which were constructed. (Author)

AD-603 643 Div. 7
OTS Prices: HC $2.00/MF $0.50

Ion Physics Corp., Burlington, Mass.
ELECTROSTATIC POWER GENERATOR,
Quarterly technical progress rept. no. 3, 15 Apr-15 Jul 64,
by C. N. Coenraads. 15 Jul 64, 31p
Contract AF33 615 1168, Proj. 8128, Task 812808
Unclassified report

Descriptors: (*Electrostatic generators, Design), (*Power supplies, Electrostatic generators), Power equipment, Tests, Vacuum seals, Electrodes, Metal coatings, Electric insulation, Crystal growth, Single crystals, Aluminum, Transformers, Models (Simulations).

The generator system entered the testing stage. Seal testing is entering its final stage with satisfactory performance to 6000 rpm so far. The insulation strength of 1000 sq cm electrodes with a 1 mm separation was not increased but the previously reached 35 kV insulation level was re-established repeatedly. A better understanding of the mechanisms involved in electrical breakdown in vacuum will undoubtedly make further advances possible. The study of excitation methods for the generator was successfully terminated and resulted in a design and a working scale model. (Author)

AD-603 664 Div. 7
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONTACTLESS SINGLE-PHASE SYNCHRONOUS GENERATOR,
by L. M. Palastin. 9 Jul 64, 6p
FTD TT64 483; TT 64 71185
Unclassified report

Unedited rough draft trans. of Russian patent no. 153323 (appl. no. 730176/24-7, 12 May 61).

Descriptors: (*Generators, Design), Power equipment parts, Coils, Armatures, Magnets, Electrical properties, Manufacturing methods, Patents, USSR.

The invention involves a contactless single-phase synchronous generator with a quadripole loaded stator which has two cores for concentrated coils of the armature winding, two permanent magnets, two magnetic shunts, and adjustable excitation winding which includes magnets and magnetic shunts and with a windingless rotor which switches over the magnetic flux in the stator with change of its direction in the cores of the armature winding; and which is distinguished by the fact that for the purpose of simplifying the design and the technology of the production as well as improvement in the mechanical stability of the stator and the characteristics of the machine, the sheets of the stator are produced by one stamping for the forming of the magnetic conductor without joint clearances. For the purpose of widening the limits of adjustment of the output voltage on each steel sheet of the stator, there are two magnetic shunts for each bar of the permanent magnet which form a covered recess into which there is placed the respective magnet. (Author)

AD-603 686 Div. 7, 15
OTS Prices: HC $3.00/MF $0.75

Coordinated Science Lab., Univ. of Illinois, Urbana.
REALIZATION OF THE A-MATRIX OF HALF-DEGENERATE RLC NETWORKS,
by Ahmet Dervisoglu. Jul 64, 62p CSL-R-225
Contract DA28 043AMC00073E Unclassified report

Testing of the preproduction units was completed. The preproduction units were submitted to USAEMSA for approval on 1 June 1964, but later returned to SBRC.

The engineering drawings were revised to reflect the changes indicated in the Fifth Quarterly Report (AD-600 713). (Author)

compounds, Potassium compounds, Hydroxides, Gamma rays, Effectiveness, Reduction.

A study of the effects of gamma radiation on nickel-cadmium cells was continued with emphasis on the loss in capacity of the cadmium electrode and on the radiolysis of the aqueous KOH electrolyte. It was tentatively concluded that gamma radiation causes an irreversible inactivation of some of the oxidized species, Cd(OH)2, on the cadmium electrode. Experiments were carried out to study the radiolysis of aqueous KOH solutions at concentrations from 0.5 per cent to 40 per cent. Radiolysis of 30 per cent KOH containing a portion of a nickel electrode produced relatively large amounts of oxygen whereas only hydrogen was evolved during the irradiation of a similar solution containing a portion of a cadmium electrode.

AD-604 039 Div. 7, 15
OTS Prices: HC $5.00/MF $1.00

Coordinated Science Lab., Univ. of Illinois, Urbana.
NONLINEAR NETWORK ANALYSIS: THE PARAMETRIC APPROACH,
by L. O. Chua and R. A. Rohrer. Jul 64, 196p
CSL-R224
Contract DA28 043AMC00073E

Unclassified report

Descriptors: (*Electrical networks, Mathematical analysis), Numerical methods and procedures, Nonlinear systems, Polynomials, Equations, Differential equations, Stability, Integrals, Transformations (Mathematics), Theorems.

This work presents a unified theory of nonlinear RLC networks using an entirely new approach--the parametric approach. The class of networks considered includes any arbitrary time-invariant, nonlinear RLC network whose elements can be characterized by a unicursal curve. In particular, curves which are multiple-valued functions of both terminal variables such as the hysteresis curves are admissible. Through the use of Stieltjes integrals, a generalization of the concepts of 'content' and 'co-content' as well as 'energy' and 'co-energy' is made which leads directly to a generalization of the Legendre transformation. It is then shown that the equilibrium equations of such networks can always be formulated mathematically as a system of algebraic-differential equations. The Schauder fixed point theorem and the principle of contraction mapping are then used to formulate a number of existence theorems on the solutions of nonlinear resistive networks. The concept of equivalent nonlinear networks as well as the principle of duality in nonlinear networks is introduced and a number of useful theorems on equivalent nonlinear networks are presented. (Author)

AD-604 043 Div. 7, 8, 15
OTS Prices: HC $4.00/MF $1.00

Laboratory for Electroscience Research, New York Univ., N. Y.
ON THE ANALYSIS AND SYNTHESIS OF SWITCHING NETWORKS COMPOSED OF m-out-of-n DECISION GATES. Technical rept.,
by Manush Raship. Jun 64, 144p NYU TR-400-95
Grant AF AFOSR24 64
AFOSR 64 1378

Unclassified report

Descriptors: (*Switching circuits, Gates (Circuits)), (*Gates (Circuits), Switching circuits), Computer logic, Analysis, Synthesis, Decision theory, Algebra, Functions.

A formal algebra, called m-out-of-n decision logic, is developed for the analysis and synthesis of switching networks made up of m-out-of-n decision gates. An m-out-of-n decision gate is defined as a device that can be described by a threshold function whose weights and threshold are positive integers. Such a threshold function is also referred to as an m-out-of-n decision function. A set of theorems is derived from an axiom set, and the inclusion of Boolean algebra and 3-input majority-decision logic as special cases of the m-out-of-n decision logic is demonstrated.

AD-604 114 Div. 7, 12
OTS Prices: HC $1.00/MF $0.50

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL.
Quarterly technical progress rept. no. 3, 1 May-30 Jul 64, comp. and ed. by J. C. Prestridge. 14 Aug 64, 24p
Contract AF33 615 1185, Proj. 8173, Task 817303

Unclassified report

Descriptors: (*Fuel cells, Design), (*Hydrogen, Fuel cells), (*Oxygen, Fuel cells), Capillary tubes, Temperature control, Spacecraft, Electric power production, Performance (Engineering), Tests.

The package was subjected to a successful vehicle systems operational test. The Static Orbital Fuel Cell Packages are at the vehicle contractor's facility awaiting installation on an orbital vehicle. Work on the 28-volt fuel cell power system and the fuel cell analyzer is progressing according to schedule. Information acquired from multi-cell module tests was utilized to design the 28-volt fuel cell power system. (Author)

AD-604 141 Div. 7, 8, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A RANDOM WALK RELATED TO THE CAPACITANCE OF THE CIRCULAR-PLATE CONDENSER,
by E. Reich. 2 Sep 52, 8p P-322

Unclassified report

Descriptors: (*Capacitors, Capacitance), (*Numerical methods and procedures, Capacitance), (*Capacitance, Numerical methods and procedures), Integral equations, Disks.

It is shown that the solution of a certain class of integral equations, among them Love's equation for the circular-plate condenser, can be expressed in terms of the mean duration of a one-dimensional random walk with absorbing barriers. (Author)

Descriptors: (*Matrix algebra, Electrical networks), (*Electrical networks, Matrix algebra), Networks, Theory, Capacitance, Inductance, Resistance (Electrical), Synthesis, Mathematical analysis.

The necessary and sufficient conditions for a matrix to be realizable as the A-matrix of an RLC network are developed. The RLC network is assumed to be non-degenerate or half-degenerate and is assumed to have a connected resistive part. First it is shown that if there exists a realization then the given matrix A can be factored into two matrices: one a diagonal matrix of positive entries and the other a symmetric-skewsymmetric (hybrid) matrix. It is shown that the given matrix A has a realization with a half-degenerate or non-degenerate RLC network which has a connected resistive part if and only if the factorization exists and both the terminal matrix and the circuit matrix are realizable. It is also shown that for a certain factorization if a realization exists, then the reactive part is unique within two-isomorphism and the resistive part can always be reduced to a complete polygon in general. In an appendix, a way of writing the A-matrix by inspection in the active half-degenerate RLC case is given and the necessary and sufficient conditions that the order of complexity be equal to the number of reactive elements in the network are developed. (Author)

AD-603 747 Div. 7, 22
OTS Prices: HC $2.00/MF $0.50

Magnavox Co., Urbana, Ill.
MINIATURIZED SPHERICAL PELLET INTEGRATING ACCELEROMETER.
Monthly progress rept. no. 9, 1-28 Feb 61,
by M. L. Myers and M. W. Bair. 1 Dec 61, 33p
Contract DA11 022ORD3413, Proj. TN2 8106
Unclassified report

Descriptors: (*Accelerometers, Miniature electrical equipment), (*Arming devices, Manufacturing methods), Integrators, Pellets, Spheres, Design, Switching circuits, Tests, Environmental tests, Life expectancy, Storage, Controlled atmospheres, Surface area.

The study program has not produced any definite scientific proofs in any area due to the fact that the program was to small and effort was curtailed and then stopped too soon. An application of implied discoveries to improve certain manufacturing equipment has, however, greatly improved the stability characteristics of G-Switches being built on parallel contracts. In this regard, the program has produced valuable results. The applied improvements have taken the form of tighter, backfill-gas filtering, an improvement of vacuum pump and vacuum facilities, a more rigid observance of proper outgassing, a tighter control of bead processing and storage, and a more accurate control of the backfilling operation. All of these changes in manufacturing procedure are based on the implied probability that the following factors are important in the determination of stability: 1 Beads must be out-gassed at a high temperature. 2 Beads must be protected against H2O and/or O2. 3 Beads must be sealed only in a stable inert atmosphere. 4 Moly-coat layer must be uniform in thickness and quality. 5 G-Switch component parts must be outgassed at a high temperature and must be protected against contamination. Basic facilities now exist to apply the above theories to routine production unless further study shows that tighter, more scientific controls are needed. (Author)

AD-603 787 Div. 7, 19, 31
OTS Prices: HC $1.00/MF $0.50

Westinghouse Electric Corp., Lima, Ohio.
100 WATT THERMOELECTRIC POWER SYSTEM FOR BUOY APPLICATIONS.
Monthly progress rept. no. 2, 11 Jul-11 Aug 64,
by Dale A. Naumer. 11 Aug 64, 7p
Contract N600 61533 61992
Unclassified report

Descriptors: (*Thermoelectricity, Buoys), (*Buoys, Power supplies), Thermocouples, Electric power production, Generators, Marker lights, Temperature control, Programming (Computers), Modules (Electronic), Bismuth, Tellurium, Combustion, Heat transfer, Blowers, Performance (Engineering), Circuits, Thermal insulation.

During this report period the computer program to investigate heat transfer in the intake-exhaust stack was debugged. The control circuit was redesigned and the purge blower relocated to bypass the generator. Two of the 15 couple bismuth telluride modules were tested. The objective of this test program was to experimentally evaluate electrical performance (current, voltage and power) which can be expected of the test modules when operated at generator design temperatures. Tests were performed with hot side temperatures of 240-250 and 260C, and cold side temperatures of 50C.

AD-603 957 Div. 7, 8, 15, 30
OTS Prices: HC $5.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN EVALUATION OF SELECTED DESCRIBING FUNCTIONS OF CONTROL SYSTEM NONLINEARITIES.
Master's thesis,
by Robert R. Rankine, Jr. Jun 64, 179p
AFIT GGC/EE/64 16
Unclassified report

Descriptors: (*Functions, Control systems), (*Control systems, Mathematical analysis), Nonlinear systems, Linear systems, Feedback, Oscillation, Frequency, Hysteresis, Mathematical prediction.

A describing function is an amplitude-dependant generalized transfer function of a nonlinearity which can be used to represent the nonlinearity when its input is approximately sinusoidal. The simpler and more prominent or accurate describing-function generating schemes include (1) the conventional, (2) the minimum average error, (3) the equivalent gain, (4) the new rms, and (5) the corrected-conventional. An evaluation of these various schemes, based on the accuracy with which the describing functions they produce can predict the amplitude and frequency of self-sustained oscillations in a nonlinear system, reveals that the corrected-conventional describing functions are more accurate for single-valued nonlinearities. (Author)

AD-604 037 Div. 7, 4, 20
OTS Prices: HC $2.00/MF $0.50

Atomics International, Canoga Park, Calif.
THE EFFECTS OF RADIATION ON NICKEL-CADMIUM BATTERY ELECTRODES. II.
Mid-point rept. for 13 Mar-13 Jun 64,
by G. R. Argue, H. L. Recht, W. A. McCollum, and D. E. McKenzie. 29 Jul 64, 28p AI-64-161
Unclassified report

Prepared for Jet Propulsion Lab.

Descriptors: (*Electrodes, Radiation damage), (*Electrolytes, Radiation chemistry), (*Cadmium compounds, Radiation chemistry), Batteries, Nickel

AD-603 560 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Auburn, N. Y.
THE DEVELOPMENT AND EVALUATION OF A BILATERAL TRIODE SWITCH.
Quarterly progress rept. no. 1, 13 Apr-13 Jul 64,
by F. E. Gentry, R. I. Scace, and J. F. Esson.
13 Jul 64, 46p
Contract NObsr91151, Proj. SR0080304, Task 9348
Unclassified report

Descriptors: (*Electronic switches, Triodes), (*Semiconductor devices, Electronic switches), (*Triodes, Electronic switches), Silicon, Rectifiers, Conductivity, Gates (Circuits), Transistors.

This report describes the work performed toward the development of an improved bilateral triode p-n-p-n switch. In addition to a qualitative description of the operation of this new device, calculations of the sheet conductivity of double-erfc-diffused layers and of some of the effects of transverse current flow in such layers are presented. (Author)

AD-603 572 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Chalmers Univ. of Tech., Gothenburg (Sweden).
PROPAGATION OF NONLINEAR HAHN-RAMO WAVES ALONG AN ANNULAR ELECTRON CURRENT SHEATH.
Technical note no. 2,
by S. Olving and O. Nilsson. 1 Nov 63, 42p CUT-RR-40
Contract AF61 052 594
RADC TDR64 352
Unclassified report

Descriptors: (*Electron beams, Plasma physics), (*Plasma sheath, Space charges), Electromagnetic waves, Propagation, Mathematical models, Linear systems, Nonlinear systems, Signals, Distortion, Microwave equipment, Electron tubes, Sweden.

The report deals with an analytical nonlinear theory of space charge wave propagation along an annular current sheath in a conducting tunnel. The effect of nonlinearities on fundamental frequency amplitude saturation, the behavior of harmonic frequency waves and the distortion of waveforms is considered. (Author)

AD-603 573 Div. 8
OTS Prices: HC $2.00/MF $0.50

Chalmers Univ. of Tech., Gothenburg (Sweden).
SMALL-SIGNAL NONLINEAR KLYSTRON WAVES.
Technical note no. 3,
by S. Olving and M. Fischer. 1 Mar 64, 29p
CUT-RR-41
Contract AF61 052 594
RADC TDR64 367
Unclassified report

Descriptors: (*Electron beams, Klystrons), (*Space charges, Nonlinear systems), (*Microwaves, Propagation), Excitation, Velocity, Modulation, Harmonic analysis, Geometric fors, Sweden.

The report deals with the nonlinear aspects of space charge wave propagation along a velocity modulated, confined, solid electron beam of finite radial extension. The gridded modulation gap is infinitely short and the beam is surrounded by an infinitely well conducting concentric tunnel. Thus the system under study is a classic in the microwave art. Maxwell's field equations and the nonlinear equation of electron motion are solved with the spatial boundary values properly taken into account. The method of successive approximations is used and the second order ac beam current, which is of the second harmonic frequency, is explicitly expressed. The results are numerically interpreted by the use of a computer and presented in the form of second harmonic beam current versus axial distance graphs for a number of parameter combinations of practical interest. These results are compared with those obtained analytically for a disc-electron beam model. (Author)

AD-603 591 Div. 8, 5
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
ON THE OPTIMUM DESIGN OF MULTIPATH SIGNALS.
Physical sciences research paper,
by Neil J. Bershad. Jun 64, 17p
Proj. 5628
AFCRL 64 485; AFCRL PSRP22
Unclassified report

Descriptors: (*Multipath transmission, Signals), (*Signals, Optimization), (*Matrix algebra, Communication theory), Correlators, Signal-to-noise ratio, Errors, Probability, Calculus of variations, Statistical processes, Time, Bandwidth, Design, Communication systems, Dynamic programming.

The problem of designing optimum signals for transmission through a gaussian time-varying multipath media is investigated. The signals are constrained to be bandlimited as are the time variations of the multipath media. The results of this report indicate that varying the transmitted signal has only limited effect on the statistics of the received signal and, hence, on the error probabilities. (Author)

AD-603 627 Div. 8
OTS Prices: HC $3.00/MF $0.50

Electronic Defense Labs., Mountain View, Calif.
RECEIVER SYSTEM NOISE STUDY.
Technical memo.,
by William F. Oliver. 27 Mar 64, 54p, EDL-M658
Contract DA36 039AMC03404E
Unclassified report

Descriptors: (*Noise (Radio), Radio receivers), (*Radio interference, Radio receivers), (*Radio receivers, Signal-to-noise ratio), Networks, Cascade structures, Power, Absorption, Attenuation, Antennas, Temperature, Atmospherics, Sensitivity, Radio signals, Very high frequency, Microwave frequency, Water vapor, Oxygen, Performance (Engineering).

Receiver noise figure and sensitivity calculation (using the noise temperature approach) are discussed. Two appendices are included to aid in the consideration of system performance in the presence of a signal and to present example calculations for a typical VHF receiver subsystem. (Author)

AD-603 634 Div. 8
OTS Prices: HC $2.00/MF $0.50

Gordon McKay Lab., of Applied Science, Harvard Univ., Cambridge, Mass.
THE CIRCULAR LOOP ANTENNA IMMERSED IN A DISSIPATIVE MEDIUM.
Scientific rept. no. 6,
by Keigo Iizuka. 3 Apr 64, 28p

8. Electronics and Electronic Equipment

AD-603 521 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

General Electric Co., Syracuse, N. Y.
RESEARCH ON MICROWAVE INTERACTIONS IN SEMICONDUCTORS.
Quarterly rept. no. 4,
by R. W. Aldrich, C. R. Boyd, J. P. Dietz, and S. Wanuga. 15 Dec 63, 60p
Contract AF33 657 10088

Unclassified report

Descriptors: (*Audio amplifiers, Semiconductor devices), (*Phase shifters, Waveguides), (*Semiconductors, Piezoelectric crystals), Microwave amplifiers, Pulse amplifiers, Diodes (Semiconductor), Single crystals, Silicon, Cadmium compounds, Sulfides, Transducers, Ultrasonic radiation.

The first task was to develop three inch long p-n junctions in single crystal silicon which could be incorporated in waveguides as active phase-shifting elements for measurement purposes. Recent advances in the field of ultrasonics have produced direct observation of electron-phonon interaction in piezoelectric semiconductors. The most important device to emerge from this work is the ultrasonic piezoelectric semiconductor amplifier. In this device, when the drift velocity of conduction electrons in a piezoelectric semiconducting crystal exceeds the velocity of an acoustic wave traveling in the same direction, energy is transferred from the electrons to the acoustic wave such that acoustic amplification takes place. A shear wave CdS amplifier centered at 48.5 megacycles showed 23 db insertion gain operating in pulsed condition. Related experimental data observed in this amplifier such as gain saturation and limiter action are given. Parts of the amplifier structures such as transducers, bonds, and contacts are discussed as well as experimental measurements on other amplifier structures.

AD-603 544 Div. 8, 25, 30
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Lab., Corona, Calif.
MILLIMETER INTERFEROMETER,
by J. W. Battles and D. E. Crane. 1 Aug 64, 18p
NAVWEPS 8201

Unclassified report

Descriptors: (*Interferometers, Millimeter waves), Spectrum analyzers, Waveguides, Dielectric properties, Standing wave indicators, Prismatic bodies, Mathematical analysis, Measuring devices (Electrical and Electronic), Design.

A millimeter interferometer, based on the Froome interferometer, has been designed and built in such a way that no calibration is necessary to measure the complex dielectric constant of a given material. The interferometer (which has been operated at 35 Gc) is mathematically described, and its operation is explained. Ultimately, the unit is expected to be operable at frequencies greater than 70 Gc. (Author)

AD-603 547 Div. 8
OTS Prices: HC $2.00/MF $0.50

SFD Labs., Inc., Union, N. J.
APPLIED RESEARCH ON EXTENDED INTERACTION IN ICEM MAGNETRONS.
Interim engineering rept. no. 1, 16 Apr-16 Jul 64,
by W. R. Zettler. Jul 64, 29p SFD-42-IER-1
Contract AF33 615 1570

Unclassified report

Descriptors: (*Magnetrons, Cascade structures), Microwave oscillators, Tuning devices, Design, Feasibility studies, Resonators, Power amplifiers, K band.

This report covers the first three month's activities on a program to explore the feasibility of combining two, three or more Ka-band interaction structures in cascade to produce an N-tupling of the peak and average power capability of a single stage. Activity to date has progress in two paths - analytical and mechanical. Analysis of the transmission line problems involved has determined the proper electrical design approach for the early models. Further analytical work is essential and is being pursued. The mechanical design, which involves modification of a basic Ka-band ICEM magnetron, has proceeded satisfactorily, and initial parts procurement has begun. The first hot test vehicle will be tested during the next quarterly period. (Author)

AD-603 552 Div. 8
OTS Prices: HC $2.00/MF $0.50

Illinois Univ., Urbana. Engineering Experiment Station.
DESIGN AND OPERATION OF A RADIATING LENS FED BY A GOUBAU BEAM-WAVEGUIDE.
Antenna Lab. technical rept. no. 80,
by P. E. Mast, M. Fournier, and J. F. Kauffman.
Jul 64, 45p
Contract AF33 657 10474, Proj. 6278, Task 627801

Unclassified report

Descriptors: (*Waveguide couplers, Lenses), (*Lenses, Waveguide couplers), Millimeter waves, Waveguides, Dielectric properties, Electromagnetic properties, Antenna radiation patterns, Design, Operation.

The Goubau electromagnetic beam waveguide has given rise to the interesting problem of coupling energy between the guiding system and free space in an efficient manner. In this report, a coupler consisting of dielectric lenses is considered. The Goubau electromagnetic beam waveguide is used as a feed line. The coupler modifies the field distribution so as to illuminate a large radiating lens. The method of approach to the design of such a coupler is that of geometrical optics. This approach is justified as a first approximation since the dimensions of the elements in the guiding section as well as those in the coupling system are very large compared to a wavelength. (Author)

AD-603 559 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Friez Instrument Div., Bendix Corp., Baltimore, Md.
ML-419 THERMISTOR P.E.M.
Quarterly progress rept. no. 5, 1 Jan-31 Mar 64,
by J. T. George. 31 Mar 64, 9p
Contract DA36 039AMC01 465E

Unclassified report

Descriptors: (*Thermistors, Production), Processing, Clay, Quality control, Radiosondes, Loading (Mechanics), Electrical properties.

The report describes testing and evaluation of thermistor rods of the final clay composition, preproduction sample testing and evaluation, new equipment and equipment considerations, and progress on the preparation of quality control manual. (Author)

perturbation techniques and network transformations. (Author)

AD-603 660 Div. 8, 25, 26
OTS Prices: HC $2.00/MF $0.50

Motorola, Inc., Phoenix, Ariz.
PRODUCTION ENGINEERING MEASURE. HIGH SPEED SEMICONDUCTOR SWITCH (TWO TERMINAL) HIGH SPEED SEMICONDUCTOR SWITCH (GATE).
Quarterly rept. no. 4, 29 Feb-28 May 64,
by B. G. Burlingame. 28 May 64, 32p
Contract DA36 039AMC01475E

Unclassified report

Descriptors: (*Electronic switches, Semiconductor devices), (*Semiconductor devices, Manufacturing methods), Bonding, Ultrasonic radiation, Electric terminals, Design, Packaging, Diodes (Semiconductors), Disks, Chemical milling, Epitaxial growth, Diffusion, Metal coatings, Alloys, Electrical properties, Vapor plating, Gold, Boron, Aluminum, Phosphorus, Test equipment (Electronics).

A pilot production facility capable of producing high speed semiconductor switches in accordance with Signal Corps technical specifications is considered. The major problem areas to be overcome in order to achieve the purpose of this program are forward breakover voltage and current on the two-terminal device, forward blocking current on the three-terminal device, and switching speeds, current carrying capabilities, forward anode voltage, and rate of forward voltage rise on both devices. Work performed furing the period 29 February 1964 through 28 May 1964 is covered. Package designs for both devices are discussed, and progress made on assembly methods, gold diffusion, epitaxial, alloy, and moat-etching procedures is reported. (Author)

AD-603 677 Div. 8, 25, 26
OTS Prices: HC $1.00/MF $0.50

Knights (James) Co., Sandwich, Ill.
CRYSTAL UNITS TYPE CR-(XN-11) /U, 1 TO 20 MC IN THE TYPE HC-27/U GLASS HOLDERS.
Progress rept. no. 11, 1 May-31 Jul 63,
by Roger E. Bennett. 31 Jul 63, 18p
Contract DA36 039sc81274

Unclassified report

Descriptors: (*Crystals, Semiconductor devices), (*Crystal holders, Manufacturing methods), Heat treatment, Glass seals, Glass, Induction heating, Bonding, Quartz, Adhesives, Aging (Materials), Vacuum seals, Medium frequency, High frequency, Electrical conductance, Mechanical properties.

Successful processes for sealing and annealing the HC-27/U glass holder are described, together with the use of Pyroceram to bond the quartz plate to the mounting supports. Aging data is given for 1, 9, and 20 mc units. (Author)

AD-603 710 Div. 8
OTS Prices: HC $3.00/MF $0.50

Litton Systems, Inc., Waltham, Mass.
LIMITING FORMS AND NON-GAUSSIAN STATISTICS IN SIGNAL PROCESSING THEORY, I.
Technical rept.,
by David Middleton. 15 Apr 64, 52p TR64-6-BF
Contract Nonr3320 00

Unclassified report

Descriptors: (*Detection, Signal-to-noise ratio), (*Signals, Communication theory), (*Statistical processes, Detection), Probability, Errors, Decision theory, Measure theory, Statistical functions, Sonar signals, Radar signals, Correlators, Detectors, Optimization.

This report presents an introductory study of representations of non-normal processes and their approach to normality under special conditions. In particular, the Edgeworth series development is applied, in one and more dimensions, to obtain conditions for a process to exhibit gaussian structure, whether under discrete or continuous sampling on an interval. For the former, the usual condition is that of a large number of independent samples (essentially, the critical condition required in the central limit Theorem), such that the Edgeworth correction terms vanish through all orders. It is shown, also, that this condition may not obtain for certain types of process, where an alternative Laguerre development may be more appropriate, characterized by a form of chi square - distribution with few degrees of freedom. Some processes that are inherently non-gaussian, such as the important Poisson process (an example of an infinitely divisible point-process), become essentially normal when their point-'density' becomes sufficiently great. A generalized Poisson process of importance in radar and sonar studies is described here and its nth order characteristic functions are specifically obtained, along with its associated first-and second-order moments and covariance function. A variety of examples involving optimum and suboptimum systems (such as auto- and cross-correlation detectors) for signal processing purposes, are used to illustrate the approach to, and departure from, the normality studied more generally in the preceeding sections. (Author)

AD-603 712 Div. 8
OTS Prices: HC $1.00/MF $0.50

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
CALCULATION OF INTRA-PULSE PHASE SHIFT IN LINEAR BEAM MICROWAVE TUBES.
Technical rept.,
by David D. Hallock. Apr 64, 18p
Task 1G6 22001A055 04 62
AELRDL TR2465

Unclassified report

Descriptors: (*Electron tubes, Microwave frequency), (*Phase shift, Electromagnetic pulses), (*Microwave amplifiers, Phase shift), Electron beams, Ions, Neutralization, Space charges, Gas ionization, Velocity, Transport properties, Linear systems, Functions, Equations, Traveling-wave tubes, Space communication systems, Radar signals.

The intra-pulse phase shift that occurs in a linear beam microwave tube, due to ion neutralization of the space charge of the electron beam, is calculated under certain simplifying assumptions. The final results, based on the well-known rate of ion formation in a gas, relates the phase change to the pulse length, gas pressure, beam voltage and current, and to the number of beam wavelengths in the interaction region. Using the theory derived herein, comparison of the calculated intra-pulse phase shift with that observed on operating tubes, indicates that this theory is accurate and that the ionization of residual gas, which results in an increase in the beam velocity, is the prime cause of intra-pulse phase shift. The mechanism whereby the phase shift is limited to a certain maximum value is discussed. It is shown that the phase requirements on the tube are ordinarily well within the value at which this limiting effect occurs, so a detailed treatment of the limiting mechanism would be of little interest to the tube designer. (Author)

Contract AF19 604 7262, Grant NSFG20225,
Proj. 7661, Task 76615
AFCRL 64 339

Unclassified report

Descriptors: (*Loop antennas, Experimental data), Admittance, Electric currents, Admittance, Electrical conductance, Electromagnetic fields, Antenna radiation patterns, Antenna configurations, Water, Solutions, Performance (Engineering), Measurement, Environmental tests, Electric currents.

Investigations were made of the radiating and circuit properties of circular loop antennas when immersed in conducting media with various loss tangents. The following quantities were experimentally examined and compared with the available theoretical results. (1)Driving-point admittance of circular loops as a function of the circumference per wavelength, 2 pi b/lambda=beta b (2) Current amplitude and phase distributions (3) Field patterns. In each case the loss tangent of the medium is taken as a parameter. The experimental results are in good agreement with the theory. A comparison between the behavior of the loop in a conducting medium and those of a linear dipole was made wherever possible. It was discovered that there is a cut-off size beyond which the driving-point admittance of a linear dipole is the same whether or not its ends are connected to form a loop. This particular loss tangent is 1.06, and the cut-off size is lambda/2. A circular loop antenna with beta b=1.0 is excited predominantly in a dipole mode and its field pattern resembles that of a two-element dipole array. A study was made to determine how this pattern becomes more like that of a monopole as the loss tangent of the solution is increased. (Author)

AD-603 635 Div. 8
OTS Prices: HC $3.00/MF $0.75

Gordon McKay Lab. of Applied Science, Harvard Univ., Cambridge, Mass.
RESEARCH ON THE PROPERTIES OF ANTENNAS IN CONDUCTING MEDIA.
Scientific rept. no. 8,
by Keigo Iizuka. 15 Apr 64, 71p
Contract AF19 604 7262, Grant NSF20225, Proj. 7661, Task 76615
AFCRL 64 436

Unclassified report

Descriptors: (*Antennas, Experimental data), Dipole antennas, Loop antennas, Test equipment, Electrical properties, Electrical conductance, Antenna radiation patterns, Electromagnetic fields, Polarization, Antenna configurations, Performance (Engineering), Environmental tests, Electric currents, Probes (Electromagnetic), Electromagnetic waves, Measurement.

This report is intended to give a summary of the research on the properties of the various kinds of the antennas in the conducting media. The types of the antenna studied include bare or insultated dipole antennas and a bare circular loop antenna. The dimensions of the media were either finite or infinite in extent. The detailed illustration of the experimental setup is also added. (Author)

AD-603 645 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Cornell-Dubilier Electronics Div., Federal Pacific Electric Co., Norwood, Mass.
PRODUCTION ENGINEERING MEASURE FOR CAPACITORS, FEED-THROUGH, SOLID ELECTROLYTE TANTALUM PELLET.
Quarterly rept. no. 1, 31 Mar-30 Jun 64,
by W. G. Bailey. 30 Jun 64, 40p
Contract DA36 039AMC03630E

Unclassified report

Descriptors: (*Tantalum capacitors, Production), Electrolytic capacitors, Design, Anodes, Quality control, Test equipment.

Drawings were made of the engineering design of the feed-through capacitor and its basic parts. Two hundred anodes were made for engineering samples, using a small hand-operated press and die set. An insertion loss test fixture was designed and manufactured.

AD-603 654 Div. 8, 19
OTS Prices: HC $5.00/MF $1.00

Space General Corp., El Monte, Calif.
THEORETICAL STUDY, SHIPBOARD DIRECTION FINDING ANTENNA ARRAY.
Final rept., 14 Jun 63-24 Jan 64.
24 Jan 64, 167p SGC-393R-5
Contract N123 953 33769A

Unclassified report

Descriptors: (*Antennas, Direction finding), (*Direction finding, Shipborne), High frequency, Antenna configurations, Loop antennas, Focusing, Mathematical analysis, Linear systems, Errors, Signal-to-noise ratio, Direction finding signals, Antenna radiation patterns, Programing (Computers), Scanning, Doppler systems, Display systems, Theory, Bibliographies.

The major conclusion that can be drawn from this study is that self-focusing, wide aperture, linear antenna arrays are feasible as shipboard direction finders. It has been found that wide aperture direction finding systems have decided advantages over narrow aperture systems, and a self-focusing or adaptive wide aperture system has an additional advantage in that it has a memory capability. (Author)

AD-603 657 Div. 8
OTS Prices: HC $6.00/MF $1.25

Cooley Electronics Lab., Univ. of Michigan, Ann Arbor.
THE RECTANGULAR CAVITY SLOT ANTENNA WITH HOMOGENEOUS ISOTROPIC LOADING.
Technical rept., no. 147,
by A. T. Adams. Mar 64, 216p ORA-05549-7-T
Contract AF33 657 10607, Proj. 6278, Task 627801

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Slot antennas, Isotropism), Dielectrics, Magnetic materials, Ferrites, Waveguides, Bandwidth, Frequency.

The rectangular cavity slot antenna, with dielectric or magnetic loading, and with a compound iris in the aperture plane, is analyzed utilizing variational techniques to derive accurate design guides for efficiency, bandwidth, and resonant frequency. The problem is broken up into several steps. First, the admittance of a loaded semi-infinite wave-guide opening out into an infinite ground plane is analyzed using variational techniques. Next, the effect of the compound iris is analyzed. A stationary expression is obtained for the admittance of a loaded semi-infinite waveguide opening out into an infinite ground plane, with a compound iris in the aperture plane. This expression is evaluated using two different approximations of aperture field. Finally, the effect of the feed and the finite length of the cavity are taken into account by, respectively,

SURFACE FIELD EFFECT DEVICE STUDIES FOR HIGH RESISTIVITY GALLIUM ARSENIDE. PART I: SURFACE STATES ON GALLIUM ARSENIDE,
by Earl J. Charlson. Nov 63, 57p
Contract Nonr760 09

Unclassified report

Descriptors: (*Gallium alloys, Arsenic alloys), (*Semiconductors, Field emission), (*Diodes (Semiconductor), Surface properties), Capacitance, Resistance (Electrical), Metal films, Aluminum, Silicon compounds, Monoxides, Electron transitions, Ionization.

Surface states on a GaAs (110) surface were studied by capacitance measurements on an MIS (metal-insulator-semicondutor) diode. In particular, the small signal high frequency differential capacitance of an Al-evaporated SiO-GaAs diode as a function of d.c. bias is presented. This curve is then compared to the theoretical variation of the ideal MIS diode (without surface states) and the surface state density as a function of position in the bandgap is determined. Results indicate a distribution of states very similar to that determined by Terman (Sol. St. Elect., p. 285) and Lehovec (Phy. Stat. Sol., 3, p. 447) for the Al-thermally grown SiO2-Si system except for a factor of 10 less states on the GaAs. Contribution of charge due to ionization of bulk traps prohibited the extension of the MIS measurements, which were performed on 0.1 ohm centimeter material, to higher resistivities. (Author)

AD-603 752 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Carnegie Inst. of Tech., Pittsburgh, Pa.
SURFACE FIELD EFFECT DEVICE STUDIES FOR HIGH RESISTIVITY GALLIUM ARSENIDE. PART II: SURFACE FIELD EFFECT TRANSISTOR,
by Earl J. Charlson. Feb 64, 74p
Contract Nonr760 09

Unclassified report

Descriptors: (*Gallium alloys, Arsenic alloys), (*Semiconductors, Field emission), (*Transistors, Field emission), Single crystals, Impurities, Copper, Resistance (Electrical), Measurement, Capacitance, Electric connectors, Indium alloys, Nickel alloys, Metal films, Aluminum, Silicon compounds, Monoxides, Electrical properties.

The use of copper as a means of compensating low resistivity n-type material to high resistivity n-type material was studied. It was found that the optimum diffusion temperature for compensation can be predicted by a series of diffusions. A different method for measuring the resistivity of highly compensated semiconductors is described. In this method the semiconductor is made the dielectric of a parallel plate capacitor whose effective parallel resistance and capacitance are measured in a high frequency bridge. Surface field effect transistors using high resistivity n-type single crystal GaAs as the semiconductor are discussed. These transistors consist of two ohmic source and drain contacts of alloyed thin films of indium and nickel, a gate insulator of evaporated SiO and a gate of Al. Transistor characteristics are shown with transconductances as high as 250 micromhos; however, voltage amplification factors are low, typically 0.2 with 6 v on the drain. These characteristics resemble more nearly triodes than pentodes. This limited performance was traced to a low effective surface mobility. (Author)

AD-603 753 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh, Pa.
SURFACE FIELD EFFECT DEVICE STUDIES FOR HIGH RESISTIVITY GALLIUM ARSENIDE. PART III: INTEGRATED BANDPASS AMPLIFIER STUDIES,
by Earl J. Charlson. May 64, 48p
Contract Nonr760 09

Unclassified report

Descriptors: (*Gallium alloys, Arsenic alloys), (*Semiconductors, Field emission), (*Band-pass amplifiers, Design), Integrated circuits, Transistor amplifiers, Quartz resonators, Elasticity, Piezoelectric effect.

An integrated bandpass amplifier device consisting of a surface field effect transistor placed on the end of a longitudinally vibrating crystal was investigated. The transistor was positioned so that there is little interaction between units besides direct electrical connection. As a result, the device may be characterized as a transistor with the drain permanently connected to one terminal of a crystal with the other crystal terminal floating. Two possible circuits to obtain bandpass amplification were investigated and approximately 25% change in output around resonance was demonstrated. No attempt was made to optimize the selectivity of the device. Detailed measurements on oriented GaAs resonators is presented and, from these measurements, the elastic and piezoelectric constants were calculated. (Author)

AD-603 762 Div. 8, 14, 17, 26
OTS Prices: HC $2.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
THIN-FILM COLD CATHODES FOR MICROWAVE TUBES. Interim rept. no. 2,
by D. V. Geppert and B. V. Dore. Aug 64, 29p
Contract AF33 615 1345, Continuation of Contract AF33 657 8721, Proj. 4812

Unclassified report

Descriptors: (*Films, Cathodes (Electron tubes), (*Cathodes (Electron tubes), Microwave equipment), (*Cold cathode tubes, Microwave equipment), (*Microwave equipment, Cold cathode tubes), Sandwich construction, Thickness, Metal films, Semiconducting films, Manufacturing methods, Sintering, Oxidation, Vapor plating, Phototubes, Field emission, Zinc compounds, Magnesium compounds, Borides, Silicon compounds, Alumimum compounds, Molybdenum, Platinum, Oxides, Phosphorescent materials, Cermets, Rare earths, Glass, Composite materials, Cobalt alloys, Nickel alloys, Iron alloys.

Substrate work has been completed by the successful development of refractory Pt-alumina substrates that meet all substrate requirements. Work on SiO barriers has been completed, wth the conclusion that such barriers are unsuitable for long-life cathodes. Unexpected problems have been encountered in realizing compound oxide barriers, but a new process has been briefly investigated that promises to solve most of the problems. The problem of high lateral resistance on evaporated Pt films has been solved. Special phototubes are under construction that will permit the work function of evaporated rare-earth boride films to be measured. The life of (Zn-Mg)O barriers is at least on the order of 1000 hours. Construction of equipment is under way to permit more extensive life testing to be done. Further image tests using a phosphor screen have been made that further confirm the uniform emission current being obtained from cathodes. (Author)

AD-603 765 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Electromagnetic Technology Corp., Palo Alto, Calif.
FREQUENCY CONVERTER UNITS FOR L-BAND, S-BAND, C-BAND, AND X-BAND.
Interim development rept. no. 13, 1-31 Jul 64,

AD-603 718 Div. 8, 14
OTS Prices: HC $3.00/MF $0.50

Istituto Universitario Navale, Naples (Italy).
ARTIFICIAL DIELECTRICS FOR MATCHING OR ABSORBING EM DEVICES.
Scientific rept. no. 4,
by Gaetano Latmiral and Giorgio Franceschetti.
20 Dec 63, 54p
Contract AF61 052 589

Unclassified report

Descriptors: (*Dielectrics, Waveguides), (*Waveguides, Dielectrics), Electromagnetic waves, Microwaves, X band, Propagation, Absorption, Cylindrical bodies, Anisotropy, Polarization, Impedance matching, Measurement, Errors, Programming (Computers), Italy.

As a preliminary approach to the study of scattering from geometrically tapered layers, the cylindrical obstacle or hole type artificial dielectric is considered. The equivalent em parameters of such a device are computed, and theoretical results are compared with experimental measured data. Possible anisotropic effects are also illustrated. Measurements in the microwave region on mixture-type artificial dielectrics are referred. In order to minimize measurements errors, the optimum length of the sample is computed; digital programs for working out experimental data are illustrated. The results of measurements and computations are summarized under several graphs and tables. (Author)

AD-603 730 Div. 8, 14
OTS Prices: HC $3.00/MF $0.50

Brunswick Corp., Marion, Va.
DEVELOPMENT OF A 1200F RADOME.
Interim engineering rept. no. 5, 1 Apr-30 Jun 64,
by V. A. Chase and R. L. Copeland. 30 Jun 64, 52p
Contract AF33 657 11469, Proj. 4161, Task 416102

Unclassified report

Descriptors: (*Radomes, High temperature research), (*Ceramic materials, Laminates), (*Laminates, Ceramic materials), Thermal properties, Reinforcing materials, Glass textiles, Aluminum compounds, Phosphates, Aging (Materials), Protective treatments, Thermal expansion, Tensile properties, Deformation, Physical properties, Controlled atmospheres, Superhigh frequency, Dielectric properties, Broadband.

The work covered within this report includes investigation into the thermal and physical properties of new ceramic matrices. Promising matrices were used to fabricate glass reinforced laminates for evaluation. The primary criteria used was flexural strength after thermal aging. Additional information is reported on the effect of curing atmosphere on laminate strength. Curing in an inert atmosphere appears to have a significant effect on strength retention after thermal aging. Continued evaluation of protective finish for the glass fabric was conducted. Thermal and mechanical data on glass reinforced aluminum phosphate laminates are reported. The final report of the electrical testing of the 64 inch glass reinforced aluminum phosphate radome is given. This test shows excellent transmission and broadband properties. A discussion of problem areas, conclusions and recommendations is presented. (Author)

AD-603 736 Div. 8, 16, 25
OTS Prices: HC $2.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
JOINT SERVICES ELECTRONICS PROGRAM.
Final rept. for 15 Feb 63-14 Feb 64,
by D. O. Pederson and J. R. Whinnery. 31 Mar 64,
rev. 1 Jul 64, 47p ERL-64-12
Grant AF AFOSR139 63
AFOSR 64 0900

Unclassified report

Descriptors: (*Electronics, Scientific research), Bionics, Nervous system, Xenon, Hemoglobin, Circuits, Networks, Tunnel diodes, Parametric amplifiers, Feedback, Electron beams, Microwave amplifiers, Crossed field devices, Emissivity, Magnetrons, Lasers, Particle trajectories, Plasma physics, Magnetic pinch, Electromagnetic waves, Propagation, Scattering, Microwaves, Waveguides, Antennas, Solid state physics, Integrated circuits, Semiconductor devices, Materials, Ferromagnetic materials, Crystals, Control systems, Communication systems, Bibliographies.

Research efforts in the following areas are summarized: bioelectronics (electrophysiological properties of the nervous system, hydration studies including dielectric constant measurement of xenon-hemoglobin association compounds); circuit theory (passive network synthesis, active circuits, time-varying networks); electron streams and interactions (microwave amplifiers, noise and instabilities, emission, trajectories); plasmas (magnetic-mirror compression, homo-polar rotating plasmas, low-energy plasmas); radiation and propagation (electromagnetic scattering from conducting loops, microwave scatter from a rough water surface, dual reflect on synthesis techniques, surface waves, frequency-independent antennas); solid-state electronics (integrated circuits, materials and mechanisms); systems (control systems, communication systems). Research papers, talks, reports and memoranda sponsored by JSEP are listed.

AD-603 742 Div. 8
OTS Prices: HC $2.00/MF $0.50

Radiation Lab., Univ. of Michigan, Ann Arbor.
STUDY AND INVESTIGATION OF A UHF-VHF ANTENNA.
Bi-monthly rept. no. 9, May-30 Jun 64,
by J. E. Herman, S. B. Rhee, and A. I. Simanyi.
Jul 64, 29p ORA-05549-10-P
Contract AF33 657 10607, Proj. 6278, Task 627801

Unclassified report

Descriptors: (*Spiral antennas, Antenna radiation patterns), (*Slot antennas, antenna radiation patterns), (*Ferrites, Antenna components), Ultrahigh frequency, Very high frequency, Standing-wave ratios, Antenna configurations, Magnetic fields, Performance (Engineering), Conical antennas.

During this report period, the most encouraging result was that found for the log conical antenna wherein the use of ferrite loading inhibited the biaxial mode operation of the antenna at the low frequency end. Because of this, it is possible to say that ferrite has truly extended the useful range of operation of this type of antenna utilizing the desired axial mode. Further encouraging results were witnessed with respect to the rectangular slot filled with ferrite and utilizing magnetic bias. Certainly all aspects of magnetic bias control have not been studied in detail as yet. However, the preliminary results show that it is possible to shift upward the center frequency of the operating band through the use of magnetic bias. The deterioration of efficiency is considered a tolerable one in view of the possibilities of operating over a wider frequency band. (Author)

AD-603 751 Div. 8, 25
OTS Prices: HC $3.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh, Pa.

Descriptors: (*Ionospheric propagation, Electromagnetic wave reflections), Electron density, Distribution, Curved profiles, Ionosphere, Electromagnetic waves, Scattering, Diurnal variations, Measurement, Radio waves, Radio receivers.

A relation for the condition of minimum time delay focussing for the spherical earth geometry is obtained assuming on ionosphere with a parabolic distribution of electron density. Theoretical curves for the case of sweep-frequency backscatter are obtained that agree well with experimental values. A qualitative explanation of frequency independent echoes is given in terms of the flat earth and ionosphere approximation. Unusual cases of motions of this frequency independent echoes are discussed and explained. The diurnal and seasonal variations of back-scatter echoes from the south for the years 1962 and 1963 is given and discussed. (Author)

AD-603 786 Div. 8
OTS Prices: HC $2.00/MF $0.50

Lockheed Missiles and Space Co, Sunnyvale, Calif.
A COMMON-EMITTER BLOCKING OSCILLATOR OF STABLE DURATION.
Technical rept.,
by J. J. Rolfe. Feb 59, 42p LMSC-601931
Contract AF04 647 97

Unclassified report

Descriptors: (*Relaxation oscillators, Transistors), (*Transistors, Silicon), Resistors, Pulse generators, Circuits.

The report describes a common-emitter blocking oscillator of good pulse duration stability. An analysis is presented, with particular attention given to the use of silicon transistors. Two applications of the results are described. (Author)

AD-603 788 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Radio Corp. of America, Moorestown, N. J.
TRANSVERSE FOCAL REGION OF A SPHERICAL REFLECTOR; PART 1: GEOMETRIC OPTICS.
Scientific rept. no. 1,
by Roy C. Spencer and Geoffrey Hyde. Mar 64, 69p
Contract AF19 628 2758, Proj. 4600, Task 460007
AFCRL 64 292

Unclassified report

Descriptors: (*Reflectors, Antenna feeds), (*Optics, Reflectors), (*Antennas, Reflectors), Surface properties, Optical properties, Mathematical analysis, Graphics.

The concepts of geometric optics as applied to a spherical reflector are discussed in detail. The caustic surface of a spherical reflector is examined, with particular emphasis on the advantages of complex number notation, and representation in terms of the height of the incoming ray and the arc length along the caustic. The focal region within the caustic curves is studied, and the importance of the circle of least confusion is pointed out. The use of wavefront constructions as an alternate approach is illustrated. The functional relationships are developed for the path-length to a field point on a concentric surface in the focal region, its spherical coordinates, and the height of incoming rays. Computations are summarized on graphs. Finally, the relationship between stationary phase and path-length is mentioned. (Author)

AD-603 792 Div. 8
OTS Prices: HC $3.00/MF $0.75

Jansky and Bailey Div., Atlantic Research Corp., Washington, D. C.
INTERFERENCE CONSIDERATIONS IN RECEIVER DESIGN.
Jan 61, 97p
Contract Nobsr72789
NAVSHIPS 94329

Unclassified report

Descriptors: (*Radiofrequency interference, Radio receivers), (*Radio receivers, Design), Radiofrequency amplifiers, Oscillators, Mixers (Electronic), Intermediate frequency amplifiers, Audio amplifiers, Power supplies, Rectifiers, Limiters, Performance (Engineering), Attenuators, Circuits, Electric filters, Textbooks.

This manual is one of a series of manuals to fill the need for reference texts on radio frequency interference in the design of electronic systems. It is the purpose of this manual to acquaint the design engineer with the various aspects of radio frequency interference which may enter receiving systems and which must be considered in both general and detailed designs. Attention is focused on the generation, control, and/or confinement of radio frequency interference and the methods employed in minimizing or eliminating it. (Author)

AD-603 794 Div. 8, 30
OTS Prices: HC $3.00/MF $0.75

Lincoln Lab., Mass. Inst. of Tech., Lexington.
COMPUTER PROGRAMS FOR HAYSTACK SERVO TESTING.
Group rept.,
by L. D. Massey. 21 Jul 64, 94p LL-1964-38
Contract AF19 628 500
ESD TDR64 353

Unclassified report

Descriptors: (*Programming (Computers), Test methods), (*Servomechanisms, Antenna components), (*Compilers, Test methods), Control sequences, Digital computers, Control systems, Antennas, Positioning devices (Machinery), Performance (Engineering), Data processing systems.

The facilities available for testing the performance of the Haystack servo system using the Univac 490 digital computer are described. Sine, step, impulse, and polynomial inputs may be applied to the system. Operating instructions and examples of inputs and outputs from the various programs are given. A fairly detailed description of the program logic is provided and complete listings are included for all non-library programs. (Author)

AD-603 847 Div. 8
OTS Prices: HC $3.00/MF $0.75

Jansky and Bailey Div., Atlantic Research Corp., Washington, D. C.
INTERFERENCE CONSIDERATIONS IN TRANSMITTER DESIGN.
Jan 61, 80p
Contract NObsr72789
NAVSHIPS 94330

Unclassified report

Descriptors: (*Radio transmitters, Radiofrequency interference), (*Radiofrequency interference, Radio transmitters), Radiofrequency generators, Crystal oscillators, Frequency multipliers, Frequency dividers, Mixers (Electronics), Power amplifiers, Noise (Radio), Modulators, Radiofrequency filters, Power supplies,

by William A. Edson and Lyle C. Bacon. 15 Aug 64, 16p
Contract NObsr89536, Proj. SF0100201, Task 9294
Unclassified report

Descriptors: (Frequency converters, Design), C band, K band, L band, S band, X band, Diodes (Semiconductors), Crystal holders, Loss-pass filters, High-pass filters, Waveguide filters, Oscillators, Crystal rectifiers, Klystrons, Performance (Engineering), Impedance matching.

An L-band converter was constructed which meets all specifications at low signal levels. The down converter nearly meets all specification at the full 10 mw signal level. Experiments were conducted on an S-band converter similar to the L-band converter. A converter specifically for S-band was designed and is being fabricated. Design work was done and experiments conducted on components necessary to construct an X-band converter. Design work on an X-band converter is proceeding. Improved apparatus for launching the local oscillator and Ka-band signals was fabricated. It is being tested, in conjunction with the high pass filter, to optimize the match, minimize the loss and increase the isolation of the two parts. The high pass filter was modified slightly to improve the local oscillator rejection. A second group of twenty Sylvania D5253 crystals was received and is being evaluated and used. Fifteen klystrons were received. (Author)

AD-603 771 Div. 8, 26
OTS Prices: HC $3.00/MF $0.75

General Bronze Corp., Garden City, N. Y.
DEVELOPMENTAL PROGRAM FOR THE FABRICATION AND TESTING OF LIGHTWEIGHT WAVEGUIDE, TASK A AND TASK B.
Interim engineering rept., Phase 2, 8 May-7 Aug 64.
7 Aug 64, 96p
Contract NObsr85320, Task 9597
Unclassified report

Descriptors: (*Waveguides, Design), Construction, Antenna radiation patterns, Dipole antennas, Waveguide couplers, S Band, Phase distortion, Transmission lines, Tuning devices, Beams (Electromagnetic), Electrical properties, Electrical engineering, Mechanical drawings, Graphics, Weight.

This report covers the necessary studies required to fabricate various models to establish sufficient design data for the fabrication of 96 in lightweight serpentine waveguide structures. The electrical length is determined of each serpentine element which will result in an antenna capable of being scanned 0 to 60 degrees from broadside when the input frequency is scanned from 2850 to 3150 mc/sec. Necessary matching structures and compensations are included in the structure to insure that the input VSWR of a 96 in serpentine structure does not exceed 1.5 to 1 over the frequency range. Consideration is given to the power taper in the transmission line and radiation taper along the aperture to provide for an optimum radiation pattern. The serpentine is electrically evaluated to determine the input VSWR and the power output at each coupler when the unit is terminated in a matched load.

AD-603 773 Div. 8
OTS Prices: HC $2.00/MF $0.50

Army Signal Radio Propagation Agency, Fort Monmouth, N. J.
AVAILABLE-POWER CALIBRATION OF RECEIVING SYSTEMS FOR RADIO-PROPAGATION MEASUREMENTS,
by Richard Silberstein. Jun 64, 40p
Proj. 10129
Unclassified report

Descriptors: (*Radio waves, Propagation), (*Radio receivers, Calibration), Recording systems, Antennas, Signal generators, Circuits, Radiofrequency cables, Power, High frequency, Very high frequency.

It is shown that the available-power concept lends itself readily to the calibration of recording receivers used for amplitude measurements where the receiver is not in general matched to the rf input cable. When the antenna is matched to the cable, valid calibrations can be had by calibrating with a signal generator matched to the characteristic impedance of its cable, assumed to be the same as that for the antenna cable. This is true even when the antenna cable has some losses, if one adds to the available power measured at the receiver end, the cable losses for the matched case. If the antenna is not matched to the cable it is shown that the available power can be measured by first matching the receiver end of the cable to the cable characteristic impedance and then using the system with this matching network feeding the receiver. Cable loss must be determined for the system in the matched condition and extra losses, which are frequently negligible, added for the antenna mismatch. The circuit arrangement for a practical calibrating and recording system with a signal generator and attenuator pads is discussed. (Author)

AD-603 775 Div. 8, 15, 19
OTS Prices: HC $6.00/MF $1.25

Johns Hopkins Univ., Baltimore, Md.
REPRESENTATION AND ANALYSIS OF SIGNALS: PART XVIII: VECTOR AND TENSOR ALGEBRA OF SIGNALS APPLIED TO SATELLITE NAVIGATION.
Doctoral thesis,
by Dan C. Ross. 20 Jul 64 237p
Contract Nonr4010 13
Unclassified report

This research was sponsored by the International Business Machines Corporation.

Descriptors: (*Matrix algebra, Communication theory), (*Communication theory, Matrix algebra), (*Navigation satellites, Communication theory), Signals, Linear systems, Algebra, Systems engineering, Data processing systems, Feasibility studies.

The basic concepts of signals and linear systems are formulated in terms of finite-dimensional vector algebra. Important ideas, often confused or omitted in classical signal theory, are clarified by the system of notation and nomenclature presented in the dissertation. Measurement and specification are emphasized in the notation as is appropriate to their importance in engineering practice. The theory and notation are extended to finite-dimensional tensor product spaces. The extension to multi-linear systems of the engineer's intuitive knowledge of linear systems is illustrated. The abstract notions are illustrated by application to the familiar problem of time-domain multiplication. The utility of the notation and the tensor product concepts is demonstrated by application to satellite navigation signal processing. Descriptions of feasibility tests on the IBM 7094 and excerpts of results are presented. The results confirm the expected simplicity and indicate a surprisingly high accuracy of the processor designed by the tensor product approach. (Author)

AD-603 776 Div. 8, 2
OTS Prices: HC $2.00/MF $0.50

Puerto Rico Univ., Mayaguez.
IONOSPHERIC PROPAGATION STUDIES.
Final rept.,
by Braulio Dueno. 1 Jun 64, 46p
Contract AF19 604 8342, Proj. 4603, Task 460309
AFCRL 64 443 Unclassified report

AD-603 927 Div. 8
OTS Prices: HC $2.00/MF $0.50

Sperry Microwave Electronics Co., Clearwater, Fla.
HIGH POWER FAST FERRITE SWITCHES.
Interim development rept. no. 4, 27 Mar-27 Jun 64.
Jul 64, 29p SJ-222-0047-4
Contract NObsr89428, Proj. SR0080302, Task 9604
Unclassified report

Descriptors: (*Electronic switches, Ferrites), C band, S band, Ferromagnetic materials, Design, Manufacturing methods, Waveguides, Electromagnets, Impedance matching, Resonance, Electrical properties, Nickel, Aluminum, Gadolium, Garnet, Beryllium compounds, Oxides, Laminates, Admittance.

It has been found that low-loss operation of the C-band switch is possible above the subsidiary resonance threshold. A breadboard model of the C-band switch has been fabricated and tested at one megawatt peak power for 15 minutes with no breakdown and approximately one db insertion loss. The waveguide was pressurized to forty psig. The ferrite materials to be used both in the C-band and the S-band switches have been selected, and the waveguide dimensions have been finalized. Fabrication of metalized beryllium oxide waveguide sections and all other deliverable hardware has begun. The laminated cores for the electromagnets have been ordered, and delivery is expected July 15. On receipt of the cores, development of the driver will be resumed. (Author)

AD-603 933 Div. 8, 7, 25
OTS Prices: HC $4.00/MF $0.75

Jansky and Bailey Div., Atlantic Research Corp., Washington, D. C.
INTERFERENCE STUDIES, INVESTIGATIONS, AND TESTS CONCERNING ELECTRIC ARC-PRODUCING DEVICES.
Final rept.
30 Nov 60, 111p
Contract NObsr72681
NAVSHIPS 95938
Unclassified report

Includes review of work completed during the fourth, final interim, Feb-Nov 60.

Descriptors: (*Relays, Radiofrequency interference), (*Switching circuits, Radiofrequency interference), (*Radiofrequency interference, Electric arcs), Semiconductor devices, Transisters, Electric currents, Voltage, Tests, Ultraviolet radiation.

This report is divided into two sections. The first describes and summarizes total effort on the project; the second reviews work completed during the fourth and final interim. Conclusions and recommendations for the completed project are included as part of Section 1. Fourth interim work reported herein comprises the results of supplementary RFI investigations on electromagnetic relays and preliminary RFI investigations on solid-state switching circuits. Results of a study on RFI characteristics of germicidal lamps are also presented. Fourth interim liaison with manufacturers is reviewed. (Author)

AD-603 941 Div. 8, 26
OTS Prices: HC $3.00/MF $0.75

Motorola, Inc., Phoenix, Ariz.
PRODUCTION ENGINEERING MEASURE ON 300 MW - 400 MC POWER TRANSISTOR.
Final engineering rept. Step 1, 23 Jun 61-1 Apr 64, by R. A. Jacobs and J. E. Lemons. 1 Apr 64, 95p
Contract DA36 039sc85975
Unclassified report

Descriptors: (*Transistors, Germanium), (*Power amplifiers, Transistors), Silicon, Manufacturing methods, Ultrahigh frequency, Design, Epitaxial growth, Processing, Specifications, Silicates, Electrical properties, Packaging, Vapor plating, Films, Tests, Production control.

Contents:
Device design
Mechanical Design
Electrical Design
Process Technology
Material Preparation
Epitaxial Growth
Oxide Masking
Emitter Diffusion
Contract Metallizing
Mesa Formation
Scribing
Assembly and Packaging
Compatible Metallurgical System
Surface Passivation
Electrical Characteristics and Test Data
Compatible Metallurgical System
Surface Passivation
Process Specification

AD-603 942 Div. 8, 26
OTS Prices: HC $5.00/MF $1.00

Motorola, Inc., Phoenix, Ariz.
PRODUCTION ENGINEERING MEASURE ON 300 MW - 400 MC POWER TRANSISTOR. INSPECTION AND QUALITY CONTROL PLAN,
by W. Wibbing, J. Celentano, S. J. Kleban, J. Tombs, and J. S. Miller. 1 Oct 63, 184p
Contract DA36 039sc85975
Unclassified report

Descriptors: (*Transistors, Quality control), (*Production control, Transistors), (*Power amplifiers, Transistors), Germanium, Processing, Reliability (Electronics), Failure (Mechanics), Life expectancy, Ultrahigh frequency.

AD-603 943 Div. 8, 7, 26
OTS Prices: HC $1.00/MF $0.50

CTS Corp., Elkhart, Ind.
PRODUCTION ENGINEERING MEASURE FOR SUBMINIATURE, TRANSISTOR TYPE POTENTIOMETERS.
Quarterly progress rept. no. 12, 1 Apr-30 Jun 64,
by C. L. Holmes and D. C. Kinsey. 30 Jun 64, 18p
Contract DA36 039sc85976
Unclassified report

Descriptors: (*Potentiometers, Manufacturing methods), (*Subminiature electronic equipment, Potentiometers), Transistors, Reliability (Electronics), Failure (Mechanics), Cermets, Torque, Moisture, Performance (Engineering), Tests.

This report contains a detailed description of the work performed on the contract during the twelfth quarter (1 April 1964 to 30 June 1964). Following the submission of the 1,800 Preproduction Test samples and Preproduction Test Report, and the subsequent rejection of these items due to unsatisfactory test results, the plans for retesting of another preproduction test group were determined and a proposal for the time schedule necessary

Rectifiers, Electric terminals, Antenna components, Coupling circuits, Electromagnetic shielding, Bonding, Design, Wiring diagrams.

It is the purpose of the manual to acquaint the design engineer with the various aspects of radio frequency interference which may enter transmitting systems and which must be considered in both general and detailed designs. Attention is focused on the generation, control, and/or confinement of radio frequency interference and the methods employed in minimizing or eliminating it. (Author)

AD-603 857 Div. 8
OTS Prices: HC $4.00/MF $0.75

Laboratory for Electroscience Research,
New York Univ., N. Y.
THE USE OF SENSITIVITY AS A CRITERION IN THE SYNTHESIS OF ACTIVE NETWORKS.
Final technical documentary rept. for Feb 63-May 64, by Arvin Grabel. Jul 64, 119p
Contract AF33 657 8817, Proj. 7031, Task 703103
AL TDR64 165

Unclassified report

Descriptors: (*Networks, Sensitivity), (*Electrical networks, Synthesis), Scalers, Electrical impedance, Resistance (Electrical), Negative resistance circuits, Capacitance, Feedback amplifiers, Gain, Mathematical models, Topology, Polynomials, Cascade structures, Matrix algebra, Design, Theory.

The problem of simultaneous realization of a network function and a sensitivity function is considered. The simultaneous consideration of pole and zero sensitivity is included by utilizing the real frequency sensitivity. The method employed is to use scaling and impedance compensation to obtain the control of the sensitivity. The method evolved permits the realization of grounded, active RC networks, with specified real frequency variation. The attendant constraints resulting from realization by grounded, transformerless networks are developed. Applications to typical procedures and an evaluation based on sensitivity criteria are included. (Author)

AD-603 859 Div. 8, 25
OTS Prices: HC $3.00/MF $0.50

Jansky and Bailey Div., Atlantic Research Corp.,
Washington, D. C.
MISCELLANEOUS INTERFERENCE CONSIDERATIONS IN SWITCHING CIRCUIT DESIGN,
Jan 61, 51p
Contract Nobsr72789
NAVSHIPS 94327

Unclassified report

Descriptors: (*Radiofrequency interference, Switching circuits), (*Switching circuits, Design), Theory, Electric arcs, Sparks, Coils, Relays, Electric currents, Electric filters, Performance (Engineering), Circuits, Textbooks, Transistors.

This manual is one of a series of manuals written to fill the need for reference texts on radio frequency interference in the design of electronic systems. It is the purpose of this manual to acquaint the design engineer with the various aspects of radio frequency interference which must be considered in both general and detailed designs for switching circuits. Attention is focused on the generation, control, and/or confinement of radio frequency interference and the methods employed in minimizing or eliminating it. (Author)

AD-603 866 Div. 8, 5, 30
OTS Prices: HC $4.00/MF $0.75

Bureau of Ships, Washington, D. C.
INTERFERENCE CONSIDERATIONS IN TERMINAL EQUIPMENT DESIGN.
Jan 61, 102p
Contract NObsr72789
NAVSHIPS 94328

Unclassified report

Descriptors: (*Radiofrequency interference, Electronic equipment), (*Electronic equipment, Radiofrequency interference), Communication equipment, Multiplex, Noise (Radio), Signal-to-noise ratio, Pulse modulation, Modulation, Demodulation, Teletype systems, Facsimile equipment, Circuits, Low-pass filters, Electomognetic shielding, Television equipment, Magnetic recording systems, Computers, Intercommunication systems, Radio interference, Distortion, Design, Coding.

This manual is one of a series of manuals written to fill the need for reference texts on radio frequency interference in the design of electronic systems. It is the purpose of this manual to acquaint the design engineer with the various aspects of radio frequency interference which may enter terminal equipment and which must be considered in both general and detailed designs. Attention is focused on the generation, control, and/or confinement of radio frequency interference and the methods employed in minimizing or eliminating it. (Author)

AD-603 867 Div. 8, 6
OTS Prices: HC $6.00/MF $1.25

Bureau of Ships, Washington, D. C.
INTERFERENCE CONSIDERATIONS IN RADAR DESIGN.
Jan 61, 217p
Contract NObsr72789
NAVSHIPS 94331

Unclassified report

Descriptors: (*Radiofrequency interference, Radar equipment), (*Radar equipment, Radiofrequency interference), Radar equipment, Noise (Radar), Radar interference, Identification systems, Radar pulses, Doppler radar, Electromagnetic shielding, Bonding, Radiofrequency filters, Pulse modulation, Radar transmitters, Radar receivers, Radar antennas, Cathode ray tubes, Radar clutter, Circuits, Design.

This manual is one of a series of manuals written to fill the need for reference texts on radio frequency interference control in the design of electronic systems. It is the purpose of this manual to acquaint the design engineer with the various aspects of radio frequency interference which are involved in radar systems and which must be considered in both general and detailed designs. Attention is focused on the generation, control, and/or confinement of radio frequency interference and the methods employed in minimizing or eliminating its effects. (Author)

AD-603 885 Div. 8
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CAPACITANCE OF CIRCULAR CONDENSER,
by E. Reich. 14 Jul 50, 5p P-163

Unclassified report

Descriptors: (*Capacitators, Capacitance), Disks, Electrical properties, Mathematical analysis, Integrals.

Fourier analysis, Series, Equations, Bandwidth.

An interference modulation technique for microwave radiometry is described. The technique is considered for use in the development of a frequency selective power meter for operation over a wide range of frequencies and is applicable to wavelengths well into the low millimeter region. A tunable radiometer using interference modulation was operated as a frequency selective power meter in the 4-mm region. As a source of microwaves for system calibration, a gaseous noise source having a known temperature was used. Measurements were made to determine the power output level from a crystal harmonic generator, and the 4-mm harmonic was also used with the system when operated with a frequency resolution between half power points of 8% to investigate system selectivity and spurious responses.

AD-604 022 Div. 8, 25
OTS Prices: HC $4.00/MF $1.00

Electronic Defense Labs., Mountain View, Calif.
LIGHT MODULATION DETECTOR.
Interim engineering rept. no. 1, 15 Apr-15 Jul 64,
by Russell Targ, D. E. Caddes, E. O. Ammann, and G. A. Massey. 20 Jul 64, 132p EDL-M739
Contract AF33 615 1938, continuation of Contract AF33 657 8995

Unclassified report

Descriptors: (*Lasers, Oscillators), (*Oscillators, Lasers), Light, Modulation, Microwave frequency, Modulators, Frequency stabilizers, Stabilization, Tuning devices, Signal-to-noise ratio, Gases, Mixers (Electronic), Interferometers, Signals.

This first report describes work performed in an experimental and theoretical program for the stabilization of a laser local oscillator for use in an optical heterodyne receiver for the detection and demodulation of microwave modulated light. The work in the quarter was divided into three main phases. These are (1) the development of a single-sideband suppressed carrier laser local oscillator with maximum power, (2) control of the modes of a laser by interferometric means to assure monochromatic output, and (3) design of an automatic frequency control system to tune the laser LO in frequency in accordance with the changes in the carrier frequency of an incoming signal from an independent laser transmitter. A unique and efficient single-sideband suppressed-carrier modulator has been developed. This modulator is situated inside the laser cavity and couples out only that laser energy which has been shifted in frequency.

AD-604 050 Div. 8, 25, 26
OTS Prices: HC $6.00/MF $1.50

Sylvania Electric Products, Inc., Woburn, Mass.
PRODUCTION ENGINEERING MEASURE FOR GALLIUM ARSENIDE VARACTOR DIODE.
Final rept. for 1 Jun 62-1 Jun 64,
by C. F. Davis, Jr. 1 Jun 64, 290p
Contract DA36 039SC86736

Unclassified report

Descriptors: (*Varactor diodes, Manufacturing methods), (*Gallium compounds, Arsenides), Processing, Production control, Specifications, Epitaxial growth, Extremely high frequency, Quality control, Performance (Engineering), Attenuation, Resistance (Electrical), Capacitance, Resonance, Parametric amplifiers, Frequency multipliers.

The process for fabricating and testing gallium arsenide varactor diodes is discussed. The chronological development of the present process is outlined, including a summary of the engineering investigations performed and the general construction which has resulted. Test data from the Preproduction and Pilot Production runs are tabulated and analyzed. Materials and process specifications necessary to fabricate these diodes are included. (Author)

AD-604 068 Div. 8, 30
OTS Prices: HC $6.00/MF $1.50

IIT Research Inst., Chicago, Ill.
APPLICATION OF OPERATIONS RESEARCH TO INTERFERENCE.
Final rept., phase 2,
by Bernhard Ebstein and Frederick Bock. Jun 63,
274p IITRI-5177-FR
Contract AF30 602 2667, Proj. 4540, Task 454002
RADC TDR63 387; N63 23131

Unclassified report

Descriptors: (*Operations research, Radar interference), (*Radar interference, Operations research), Optimization, Radiofrequency interference, Control, Frequency, Radiofrequency power, Antenna radiation patterns, Linear programming, Dynamic programming, Combinatorial analysis, Computers, Programming (Computers), Programming languages, Radar equipment, Radar pulses, Search radar.

The applicability of certain optimization methods of operations research to the problem of controlling radio and radar interference by judicious assignments of equipment operating frequencies was investigated. Emphasis was placed on radar interference problems. A number of interference control methods applicable to radar and various optimization techniques which can be used in conjunction with these control methods are reviewed. A description is given of the search radar interference prediction program used to supply the input data for the optimization techniques developed. Four different optimization algorithms are presented in the form of computer programs written in the international computing language ALGOL 60. A field test involving radar frequency assignment was conducted. Interference levels were measured by interference pulse rates and subjective evaluation of PPI screen displays. A detailed account and analysis of the test procedures and results is given. It is concluded that in many situations in which radar congestion causes mutual interference problems, assignment of frequencies based on the techniques developed is feasible and desirable.

AD-604 083 Div. 8, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
APPLICATIONS OF THE KAC-SIEGERT METHOD FOR FINDING OUTPUT PROBABILITY DENSITIES FOR RECEIVERS WITH SQUARE LAW DETECTORS,
by R. C. Emerson, 14 Apr 52, 36p P-294

Unclassified report

Descriptors: (*Radio receivers, Signal-to-noise ratio), (*Signal-to-noise ratio, Radio receivers), (*Probability, Signal-to-noise ratio), Rectifiers, Detectors, Intermediate frequency amplifiers, Audio amplifiers, Noise (Radio), Statistical processes, Distribution theory, Functions, Communication theory, Statistical analysis.

The method of Kac and Siegert for finding the output probability density characterstic function for receivers with square law envelope detections is discussed and a parallel development is given for the square law rectifier. Procedures are then outlined for determining

for the completion of the contract was submitted. The 2,400 units being evaluated on the 10,000 hour load life Reliability Study have now completed 5,000 hours of testing with satisfactory results. (Author)

AD-603 965 Div. 8
OTS Prices: HC $3.00/MF $0.75

Tennessee Univ., Knoxville.
CIRCULAR ARRAYS AROUND CYLINDERS.
Scientific rept. no. 7,
by H. P. Neff, C. E. Hickman, and J. D. Tillman.
1 Jun 64, 100p
Contract AF19 628 288, Proj. 4600, Task 460002
AFCRL 64 537

Unclassified report

Descriptors: (*Antenna configurations, Cylindrical bodies), (*Dipole antennas, Electrical impedance), Scanning, Fourier analysis, Slot antennas, Loop antennas, Theory.

The report gives the theory of circular antenna arrays around cylinders. A resume of the theory of simple circular arrays is given, and both the complete far-zone field, and an expansion into spherical modes is obtained. Both the far-zone pattern and an integral form for the impedance of a dipole near an infinite cylinder are obtained by Fourier transform methods. By means of limiting process, an approximate form is obtained for a dipole near a finite cylinder. It is shown that for all three cases: simple array, array around an infinite cylinder, and array around finite cylinder, the pattern can be placed in the same form. The application to pattern synthesis and electronic scanning is discussed. (Author)

AD-603 966 Div. 8
OTS Prices: HC $2.00/MF $0.50

Tennessee Univ., Knoxville.
INVESTIGATION OF THIN WIRE CIRCULAR LOOP ANTENNAS AND ELECTRONICALLY SCANNED CIRCULAR ARRAYS.
Final rept.,
by H. P. Neff, C. E. Hickman, and J. D. Tillman.
30 Jun 64, 34p
Contract AF19 628 288, Proj. 4600, Task 460002
AFCRL 64 555

Unclassified report

Descriptors: (*Loop antennas, Antenna configurations), (*Antenna configurations, Antennas), Electronic scanners, Cylindrical bodies, Antenna radiation patterns, Dipole antennas, Impedance matching, Integral transforms, Spheres, Bessel functions, Mathematical analysis, Linear systems, Slot antennas.

This report gives the theory of circular antenna arrays around cylinders. A resume of the theory of simple circular arrays is given, and both the complete far-zone field, and an expansion into spherical modes is obtained. Both the far-zone pattern and an integral form for the impedance of a dipole near an infinite cylinder are obtained by Fourier transform methods. By means of a limiting process, an approximate form is obtained for a dipole near a finite cylinder. It is shown that for all three cases: simple array, array around an infinite cylinder, and array around finite cylinder, the pattern can be placed in the same form. The application to pattern synthesis and electronic scanning is discussed. (Author)

AD-603 984 Div. 8, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE EVALUATION OF NOISE SAMPLES,
by Arnold J. F. Siegert. 7 Sep 51, 17p P-236

Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Noise, Statistical data), (*Sampling, Noise), Statistical functions, Statistical processes, Distribution theory, Functional analysis.

Unless the primary source of noise in one of those which are theoretically tractable, the statistical properties of the noise have to be infer.ed from samples. We have developed some criteria to aid in the decision whether a sample can reasonably be assumed to have come from a Gaussian noise with predetermined parameters. (Author)

AD-604 013 Div. 8
OTS Prices: HC $5.00/MF $1.00

Navy Underwater Sound Lab., Fort Trumbull,
New London, Conn.
PATTERN OF FACTORS OF OPEN-CIRCUITED HORIZONTAL ELECTRIC MONOPOLE ANTENNAS LOCATED ON OR VERY NEAR A FINITELY CONDUCTING MEDIUM,
by Peter R. Bannister and Jane E. Christensen.
10 Mar 64, 184p
Proj. S F006 01 02 7077
USL TM941 1 14 64

Unclassified report

Descriptors: (*Antennas, Antenna radiation patterns), (*Antenna radiation patterns, Antennas), Calculus of variations, Antenna lobes, Resonance, Polarization, Performance (Engineering), Antenna configurations, Mathematical analysis.

The efficiency of horizontal electric dipole or monopole antennas follows a series of maxima and minima when plotted as a function of length. The first maximum, which is the first order resonance is of the greatest importance, since it corresponds to the maximum attainable efficiency for the figure-eight-type surface-wave pattern of the antenna. Although greater maximum efficiencies are sometimes possible with longer antennas of higher order resonances, the patterns become multilobed, and the over-all antenna efficiency is greatly reduced. It is the purpose of this technical memorandum to clarify the preceding statement by examining the pattern factors of antennas of various electrical lengths, realizing that there are advantages to be gained in certain situations by employing antennas characterized by multilobed patterns. Of the two types of horizontal electric monopole antennas, only the open-circuited (conductor completely insulated from the conducting medium) will be considered. (Author)

AD-604 021 Div. 8, 6
OTS Prices: HC $3.00/MF $0.75

Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
A FREQUENCY SELECTIVE POWER METER FOR MILLIMETER WAVES.
Final rept. for 1 Apr 63-31 Jul 64,
by M. W. Long. 29 Jul 64, 64p
Contract Nonr991 10, Projs. NR372 781, A701

Unclassified report

Descriptors: (*Radiometers, Millimeter waves), (*Power meter, Millimeter waves), (*Millimeter waves, Detection), Microwave frequency, Extremely high frequency, Bond-pass filters, Tuning devices, Interference, Doppler effect, Audio amplifiers Waveguides, Radiofrequency power, Noise (Radio),

Plasma physics), Blackbody radiation, Bremsstrahlung, Cyclotron resonance phenomena, X band, K band, Electromagnetic pulses, Microwave frequency, Magnetic fields, Electric fields, Electron accelerators, Radar equipment, Power supplies.

A theoretical and experimental program is described aimed at studying the possibility of extracting microwave power from the kinetic energy of a plasma. The appropriate theoretical framework is established. Detailed experiments were run at X-band and at K-band. The detected microwave pulse appears before onset of opacity and attains values on the order of 50 to 250 mW for a background pressure of 20 microns Hg, discharge voltages around 20 kV, and magnetic fields around 3.5 kG. The output is studied as a function of magnetic field and of the applied electric field. At K-band two peaks become apparent and these are interpreted in terms of the fundamental and the second harmonic detected in this frequency interval. It is shown that the power output detected is too high to be explained by cyclotron radiation output from a population of temperature and density not exceeding reasonable values. The mechanism of electron acceleration by overstability processes is introduced which would seem to explain the high radiation output as the cyclotron radiation from very high speed electrons accelerated by internal processes in the plasma. (Author)

AD-604 121 Div. 8, 5, 12
OTS Prices: HC $2.00/MF $0.50

Hughes Aircraft Co., Fullerton, Calif.
INTEGRATED FEED AND FRONT END STUDY OF THE PSRT.
Final rept.
Jul 64, 44p
Contract AF30 602 2939, Proj. 4519, Task 451901
RADC TDR64 182

Unclassified report

Descriptors: (*Communication satellites (Passive), Antenna feeds), (*Antenna feeds, Communication satellites (Passive)), Antenna components, Horn antennas, X band, S band, Power dividers, Transducers, Noise (Radio), Masers, Parametric amplifiers, Refrigeration systems, Microwave networks, Polarization, Performance (Engineering), Design, Specifications.

This report presents results of a technical study performed to upgrade the feed and front end assembly of the Passive Satellite Research Terminal (PSRT). The study provides the techniques, design and development data necessary to modify the existing X-band PSRT equipment to be capable of transmitting a 100-kw signal at 7.33 gc. and receiving an arbitrarily linearly polarized signal at 8.33 gc.

AD-604 131 Div. 8, 6
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE DETECTION OF A SINE WAVE IN GAUSSIAN NOISE,
by Edgar Reich and Peter Swerling. 11 Jun 52, 28p
P-305

Unclassified report

Descriptors: (*Signal-to-noise ratio, Statistical analysis), Noise, Electromagnetic pulses, Detection, Probability, Statistical functions, Sampling, Integral transforms, Communication theory.

This paper deals with the problem of finding the 'optimum' method of detecting a sine wave of known frequency and amplitude in the presence of noise. The type of noise considered is the so-called stationary Gaussian process, which is obtained when thermal noise is passed through an arbitrary linear passive device. The analysis takes into account the fact that in practice only a finite sample of observed signal is available. The optimum detection method is defined as that which maximizes the probability of recognizing the presence of a sine wave if one has actually appeared; while the probability of falsely announcing the presence of sine wave, if none has actually appeared, does not exceed some prechosen value. It is shown that when the noise has a flat spectrum, all the relevant information is contained in the amplitude and phase of the Fourier transform of the received sample at the frequency of the sine wave. Almost the same result holds in the case where the noise has an exponentially decaying autocorrelation, except that in this case the values of the observed sample at the endpoints of the sample also play a role. (Author)

AD-604 153 Div. 8
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TRANSIENT RESPONSE OF BUTTERWORTH APPROXIMATIONS OF IDEAL LOW-PASS FILTERS,
by Edgar Reich. 24 Oct 52, 9p P-339

Unclassified report

Descriptors: (*Low-pass filters, Transients), (*Filters (Electromagnetic wave), Transients), Numerical analysis, Integrals, Differential equations, Series.

AD-604 171 Div. 8, 30
OTS Prices: HC $3.00/MF $0.50

Antenna Systems Lab., Univ. of New Hampshire, Durham.
DIGITAL COMPUTER DESIGN OF THE DIPOLE PARAMETRIC AMPLIFIER ANTENNA.
Scientific rept. no. 2, 1 Nov 62-1 Sep 63,
by Albert D. Frost. 1 May 64, 52p
Contract AF19 628 307, Proj. 4600, Task 460002
AFCRL 64 447

Unclassified report

Descriptors: (*Dipole antennas, Parametric amplifiers), (*Programming (Computers), Antenna configurations), Digital computers, Design, Coaxial cables, Varactor diodes, Electrical impedance, Tuned circuits, Surface properties, Electric currents, Coupling circuits, Very high frequency, Mathematical analysis.

A procedure for the design of the coaxial dipole form of parametric amplifier antenna is outlined. This includes a presentation of the factors involved and the criteria used in the calculation of optimum dipole length, the design of the interior coaxial cavity, the selection of an output loop and the idler frequency location. Computer programs (IBM 1620) are provided for the procedures described together with a table of dual coaxial line impedance parameters. (Author)

AD-604 196 Div. 8, 25, 26
OTS Prices: HC $1.00/MF $0.50

Clevite Transistor Products, Waltham, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS.

the probability density functions directly, i.e., without solving the eigenvalue problem or inverting the characteristic function. The method depends on expanding the density function in an orthonormal series the coefficients of which are expressed in terms of cumulants which in turn are obtained from the system kernel by straightforward quadratures. As an example to illustrate the procedure, a receiver with Gaussian I. F. and Gaussian audio frequency pass characteristics is treated in detail, and the output probability density functions are found for various sinusoidal input signal strengths and I. F. vs. audio bandwidth ratios. (Author)

AD-604 087 Div. 8, 25
OTS Prices: HC $6.00/MF $1.25

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
FREE AND DRIVEN MODES IN ANISOTROPIC PLASMA GUIDES AND RESONATORS,
by Robert Likuski. Jul 64, 227p
Contract AF33 657 10224; Grant NSFG19005, Proj. 4156, Task 415604
AL TDR64 157

Unclassified report

Descriptors: (*Waveguides, Plasma medium), (*Resonators, Plasma medium), (*Electromagnetic waves, Propagation), Mathematical models, Partial differential equations, Plasma physics, Electromagnetic properties, Electron beams, Numerical analysis, Experimental data, Graphics.

Starting with Maxwell's equations containing arbitrary electric and magnetic sources, a set of uncoupled wave equations has been formulated for an anisotropic plasma. Expressions for determining the electromagnetic field components in terms of the solutions of these equations and the transverse currents have been derived and tabulated. Setting the sources equal to zero, the characteristic equations have been obtained for the axially symmetric free modes in a circular cylindrical plasma filled guide, open plasma guide and coaxial plasma guide. Extensive numerical evaluations of the characteristic equation representing the plasma filled guide have been made for the lowest order mode and a set of omega-beta curves is presented for plasma densities, magnetic fields, phase velocities and guide radii varying from zero to infinity. These curves are compared with a set obtained through the use of quasi-static approximation and with the dispersion characteristics of the right and left hand circularly polarized plane waves in an unbounded plasma. Numerical evaluations are also presented graphically for the open plasma guide and the coaxial plasma guide. (Author)

AD-604 101 Div. 8
OTS Prices: HC $1.25/MF $0.75

Harry Diamond Labs., Washington, D. C.
WIEN-BRIDGE OSCILLATOR AS A LOW-FREQUENCY REFERENCE SOURCE,
by Klaus Sann. 2 Jul 64, 102p
Projs. DA1P222901A207, 16100
HDL TR1172

Unclassified report

Descriptors: (*Oscillators, Extremely low frequency), Design, Performance (Engineering), Networks, Resistors, Glass capacitors, Stability, Reliability (Electronics), Feedback amplifiers, Aging (Materials), Shock (Mechanics), Vibration, Impedance bridges.

Design and performance of a Wien-bridge oscillator operating at 100 cps are presented. A frequency stability of .001 has been obtained over a temperature range from -55 to +85 C with a ±20- percent supply voltage change. This is one order of magnitude better than the performance of oscillators preceding this design. The use of a high-impedance RC network and field-effect transistors led to a small-sized oscillator with low power consumption (1 mw). The performance of network components subjected to 20,000 g indicates that the stability will not be degraded under shock and vibration. (Author)

AD-604 115 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Tung-Sol Electric, Inc., Bloomfield, N. J.
HIGH SPEED POWER AMPLIFIER USING ELECTRON BEAM SWITCHED P-N JUNCTIONS.
Final development rept. for 26 Jun 63-26 Jun 64, 21 Aug 64, 25p
Contract NObsr89493, Proj. SR0080304, Task 9293

Unclassified report

Descriptors: (*Power amplifiers, Pulse amplifiers), (*Pulse amplifiers, Diodes (Semiconductor)), Electron beams, Electromagnetic pulses, Electron guns, Silicon, Voltage, Gain, Design, Surface properties.

A 20 KV electron beam multiplier (EBM) tube has been made to deliver a 10 ampere positive pulse of one microsecond or more in duration at 100 to 1,000 pps. The diode voltage was 125 volts (saturation point). Another tube delivered an 8 ampere pulse at 70 volts. The current gain has been consistently in the order of 5,000. A modified standard TV electron gun gave -40 volts grid cut-off at a beam current of 4 milliamperes and 20 KV anode potential. Slightly different modifications gave -13 volts cut-off at 1.0 ma beam current. There is every indication that a further modification could give -20 volts or less cut-off at a beam current of 3 to 4 milliamperes based on the most recent experimental guns. Deterioration problems are encountered in the diode. These are analyzed in a consideration of EBM diode design. (Author)

AD-604 119 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Erie Technological Products, Inc., Pa.
PRODUCTION ENGINEERING MEASURE FOR RESISTOR-CAPACITOR MICROELEMENTS FOR MICROMODULES.
Quarterly rept. no. 4, 28 Mar-26 Jun 64,
by J. E. Schupp. 26 Jun 64, 32p
Contract DA36 039AMC01479E

Unclassified report

Descriptors: (*Capacitors, Manufacturing methods), (*Resistors, Manufacturing methods), Modules (Electronic), Microminiaturization (Electronics), Jigs, Paint applicators, Barium compounds, Titanates, Dielectrics, Fracture (Mechanics), Performance (Engineering), Resistance, Voltage, Temperature.

AD-604 120 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Advanced Kinetics, Inc., Costa Mesa, Calif.
PLASMA KINETIC ENERGY-RF CONVERSION.
Final rept.
Jul 64, 80p
Contract AF30 602 2981, Proj. 5573, Task 557303
RADC TDR64 174

Unclassified report

Descriptors: (*Microwaves, Generators), (*Plasma oscillations, Energy conversion), (*Energy conversion,

Descriptors: (*Quartz resonators, Aging (Materials)), (*Aging (Materials), Quartz resonators), (*Radation damage, Quartz resonators), High frequency, Low frequency, Medium frequency, Frequency shift, X-ray diffraction analysis, Reliability (Electronics), Crystal structure, Strain (Mechanics), Quartz.

Data on the aging of 3 Mc and 16 Mc AT-cut quartz resonators are summarized. The aging rates of precision 3 Mc resonators of natural, swept, cultured, and swept cultured quartz vared with the type of quartz. Aging rates ranged from 1 to 9 pp 10 to the 8th power/wk initally but decreased to 0.2 to 3 pp 10 to the 8th power/wk after 20 weeks. The average aging rate of unswept cultured quartz alone remained > 1 pp 10 to the 8th power/ wk. 16 Mc resonators irradiated at SPRF (10000 rads of gamma + 9 x 10 to the 13th power nvt) or exposed to a Cs 137 gamma source (10000 rads of gamma) exhibited shifts in frequency of a few parts in 10 to the 7th power. The shifts were negative for natural quartz, positive for cultured quartz, and very small for the swept cultured quartz. X-ray source image distortion (SID) patterns have been made of low frequency and 10 Mc resonators of typical and atypical aging behavior. Examples of scratches, twinning, strain, and other internal defects are exhibited. SID patterns of 10 Mc resonators of poor aging behavior have revealed a number of units with defects leading into the central zone of the quartz plates. SID patterns made of low frequency resonators revealed the normal driven zones of a 455 Kc DT cut resonator and an abnormal pattern for a unit with a large defect zone near one end.

Quarterly progress rept. no. 7, 31 Oct 63-31 Jan 64,
by Lucille T. Kelley and Jeremiah A. LoConte.
31 Jan 64, 24p
Contract DA36 039SC86724

Unclassified report

Descriptors: (*Transistors, Germanium), (*Manufacturing methods, Transistors), Design, Quality control, Reliability (Electronics), Failure (Mechanics), Stresses, Life expectancy, Alloys, Soldering, Chemical milling, Encapulation, Dessicants, Environmental tests, Semiconductor devices.

Engineering design changes have been completed and evaluated. The new process and production techniques have been evaluated and implemented into the production line flow. All units in the final production run were assembled according to conditions specified in the final contract agreement. Quality Control procedures have been reviewed. The Q. C. Manual will be included in the final report. Final reliability proof testing is in process. An improved failure rate is indicated, but at this date the data is insufficient to draw final conclusions. (Author)

AD-604 228 Div. 8, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PASSAGE OF STATIONARY PROCESSES THROUGH LINEAR AND NON-LINEAR DEVICES,
by A. J. F. Siegert. 29 Oct 53, 27p P-419

Unclassified report

Presented at the Symposium on Statistical Methods in Communication Engineering, Berkeley, Calif., 17-18 Aug 53.

Descriptors: (*Communication theory, Noise (Radio)), (*Noise (Radio), Statistical analysis), Signal-to-noise ratio, Statistical functions, Probability, Distribution theory, Detectors, Linear systems, Nonlinear systems.

The problem of finding the probability distribution of the noise output of a receiver consisting of a filter, a detector, and a second filter is discussed. Methods are discussed which have led to solutions of this problem in some special cases. In the case of multidimensionally Markoffian x(t) the problem is shown to be equivalent to an integral equation, which in many cases of interest reduces to a differential equation. (Author)

AD-604 250 Div. 8, 25
OTS Prices: HC $5.00/MF $1.00

Motorola, Inc., Phoenix, Ariz.
MICROWAVE ACOUSTIC DELAY LINE AND RELATED ACTIVE DEVICES,
Jul 64, 159p
Contract AF30 602 3076, Proj. 5578, Task 557802
RADC TDR64 246

Unclassified report

Descriptors: (*Delay lines, Microwave frequency), (*Acoustic equipment, Semiconductor devices), (*Cadmium compounds, Sulfides), Electroacoustic transducers, Energy conversion, Single crystals, Microwave amplifiers, Heat exchangers, Crystal oscillators, Electrodes, Negative resistance circuits, Hall effect, Generators, Phonons, Ultrasonic radiation.

Generation of useful rf power outputs in CdS crystals was demonstrated with outputs up to 156 mw at the terminals without the need for transducers. High efficiency (3 db conversion loss) diffusion layer integral transducers were achieved in ultra high purity CdS crystals. Feasibility of complete functional devices from a single crystal of material was shown with integral delay lines and amplifiers. The use of thermal heat sinks and proper choice of crystal geometry were shown to overcome most of the obstacles to achievement of continuous operation of electroacoustic devices. Initial results included satisfactory operation of A CdS oscillator at a duty factor greater than 0.1. Efforts were continued with significant results in the general areas of more efficient electric/acoustic transducers, suitable drift field electrodes and negative resistance elements and circuits. (Author)

AD-604 254 Div. 8
OTS Prices: HC $2.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
A SIMPLIFIED VARIABLE POLARIZATION ANTENNA,
by John L. Kerr. May 64, 38p
Task 1G6 20901A040 01
USAEL TR2423

Unclassified report

Descriptors: (*Antennas, Polarization), Antenna feeds, Waveguides, Propagation, Design, Antenna configurations, Antenna radiation patterns, Extremely high frequency, Bandwidth, Standing wave ratios, Millimeter waves, Copper.

Development of a simplified variable-polarization antenna was based on a waveguide feed arrangement in which a polarizing element and the input field were independently rotatable about the axis of propagation. A squeezesection polarizer with a cross section approaching an ellipse seemed particularly useful in applications at wavelengths. Such a polarizer was fabricated by squeezing round copper tubing in a roller device in which the amount and length of squeeze could be precisely controlled. With this variable-polarization antenna, linear polarzation in any plane about the axis of propagation and rotating linear polarization may be easily obtained. Right or left circular polarization, also right or left elliptical polarization of any axial ratio between linear and circular may be selected. (Author)

AD-604 256 Div. 8, 25, 30
OTS Prices: HC $7.15/MF $2.00

California Univ., Riverside.
TABLES OF NON-RELATIVISTIC ELECTRON TRAJECTORIES FOR FIELD EMISSION CATHODES.
Technical rept. no. 3 (rev.),
by Allan M. Russell. Oct 62, rev. Jul 64, 412p
Contract Nonr1842 02, Proj. NR017 441
AD 290 696 rev; N63 10498 rev.

Unclassified report

Descriptors: (*Particle trajectories, Electrons), (*Electrons, Particle trajectories), (*Fluid emission, Cathodes (Electron tubes)), (*Cathodes (Electron tube), Field emission), Microscopes, Mathematical analysis, Digital computers, Programming (Computers), Electron optics, Tables.

AD-604 269 Div. 8
OTS Prices: HC $3.00/MF $0.75

Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
QUARTZ CRYSTAL AGING EFFECTS.
Quarterly rept. no. 5, 15 Feb-15 May 64,
by R. B. Belser and W. H. Hicklin. 15 May 64, 75p
Contract DA36 039AMC02251E,
Projs. 1G6 22001A 058 01 07, A680 Unclassified report

Descriptors: (*Fluid flow, Turbulence), (*Turbulence, Statistical analysis), (*Convection, Fluid mechanics), Reynolds number, Partial differential equations, Fourier analysis, Statistical functions, Statistical distributions.

It is argued that Eulerian formulations are intrinsically unsuited for deriving the Kolmogorov theory because low-order Eulerian moments do not express sufficiently well a statistical dependence of nonsimultaneous amplitudes that accompanies the convection of small spatial scales by large spatial scales. Illustration is made by applying the direct-interaction approximation and a related, higher Eulerian approximation to an idealized convection problem and to a modified Navier-Stokes equation. Convection effects of low wave numbers on high wave numbers are removed in the modified equation, and as a consequence the direct-interaction approximation for it yields the Kolmogorov spectrum. Low-order Lagrangian moments provide a promisingly more complete description of the convection of small spatial scales by large, and a search for satisfactory Lagrangian closure approximations seems highly desirable. (Author)

AD-603 629 Div. 9, 15
OTS Prices: HC $3.00/MF $0.50

Kraichnan (Robert H.) Peterborough, N. H.
LAGRANGIAN-HISTORY CLOSURE APPROXIMATION FOR TURBULENCE.
Research rept. no. 7,
by Robert H. Kraichnan. Jul 64, 53p
Contract Nonr4307 00, Proj. NR062 309
Unclassified report

Descriptors: (*Fluid flow, Turbulence), (*Turbulence, Statistical analysis), Analysis of variance, Green's function, Moments, Integrals, Transformation (Mathematics), Relaxation time, Convection, Fluid mechanics.

The direct-interaction approximation for turbulence is extended to predict the covariance and average Green's function of a generalized velocity. The latter is defined as the velocity measured at time r in the fluid element which passes through the point x at time t. The resulting formulas for triple moments involve integrals over the Eulerian time-history of the fluid. The approximation is then altered so that the integrals are instead over Lagrangian histories, measured along the particle paths. The alteration is made necessary and is uniquely determined by requiring simultaneously the consistency properties that energy be conserved; that there exist formal inviscid equipartition solutions; and that the dynamics exhibit invariance under a class of random Galilean transformations. In the altered approximation, the relaxation times associated with energy-transfer are Lagrangian memory times determined by the viscous and pressure forces. As a result, the approximation yields the Kolmogorov inertial- and dissipation-range laws. The corresponding approximation for convection of a passive scalar field yields some exact results of Taylor and yields Richardson's law for the relative diffusion of two particles.

AD-603 652 Div. 9, 13, 20
OTS Prices: HC $3.00/MF $0.50

Engineering Projects Lab., Mass. Inst. of Tech., Cambridge.
TWO-PHASE GAS-LIQUID FLOW OSCILLATIONS: PRELIMINARY SURVEY,
by S. William Gouse, Jr. Jul 64, 56p, DSR-8734-5
Contract Nonr1841 73
Unclassified report

Descriptors: (*Fluid flow, Oscillation), (*Hydrodynamics, Boiler tubes), Gas flow, Liquids, Pipes, Boilers, Boiling water reactors, Reports, Reviews.

A review of a representative number of references for various types of two-phase gas-flow oscillations has been conducted. The principal conclusion is that at this time there is no reliable way to predict the onset of, magnitude of, frequency of, and disappearance of flow oscillations in two-phase flow systems. A consensus of the existing experimental results indicates that the tendency for a system to oscillate can be reduced by reducing the inlet subcooling, increasing the system pressure level, eliminating heated section exit restrictions, decreasing fluid level in a riser, if present, and increasing the flow restriction at the heated section inlet. In addition, it is believed that useful stability maps can be prepared that indicate regions of operation in which there will be no flow oscillations. For a given fluid system, the parameters necessary to determine this map are geometry, inlet subcooling, flow rate and heat flux. (Author)

AD-603 659 Div. 9
OTS Prices: HC $5.00/MF $1.00

Engineering Projects Lab., Mass. Inst. of Tech., Cambridge.
AN INTRODUCTION TO TWO PHASE GAS-LIQUID FLOW,
by S. William Gouse, Jr. Jun 64, 156p DSR-8734-3
Contract Nonr1841 73
Unclassified report

Descriptors: (*Gas flow, Textbooks), (*Fluid flow, Textbooks), Gases, Liquids, Phase studies, Mathematical models, Integral equations, Differential equations, One-dimensional flow, Two-dimensional flow.

Contents: equations of change in integral form; equations of change in differential form; one dimensional flow continuity relations and definitions; analytical models for conservation of momentum and energy; homogeneous flow model; homogeneous flow model example; two-dimensional homogeneous two-phase one-component flow; Martinelli et al two-phase flow model; momentum exchange model; separated phase analytical model; other approaches.

AD-603 668 Div. 9, 25
OTS Prices: HC $4.00/MF $0.75

Institute of Engineering Research, Univ. of California, Berkeley.
THE APPLICATION OF LANGMUIR PROBE TECHNIQUES TO FLOWING IONIZED GASES,
by Clark L. Brundin. 15 Jun 64, 118p AS-64 9
Contract Nonr222 45; Grant AF AFOSR536 64
Unclassified report

Descriptors: (*Plasma medium, Probes (Electromagnetic)), (*Argon, Gas ionization), (*Supersonic wind tunnels, Probes (Electromagnetic)), Superaerodynamics, Stagnation point, Ions, Density, Ionic current, Electrons, Temperature, Electric currents, Frozen equilibrium flow.

A detailed theoretical and experimental investigation regarding the use of Langmuir probe techniques in a flowing partially ionized gas was carried out. Both free molecule and stagnation point probes were considered. The analysis is restricted to the determination of ion density from the saturated ion current, and the determination of electron temperature from the rate of change of electron current with probe potential. Numerical results are presented for argon, along with the results of a series of experiments conducted in an arc heated supersonic low density wind tunnel. It is concluded that the ion density can be measured accurately with a stagnation point probe, or with a plane free molecule probe surrounded by a guard ring. The electron temperature can be measured accurately with a guarded plane free molecule probe, or

9. Fluid Mechanics

AD-603 567 Div. 9
OTS Prices: HC $2.00/MF $0.50

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
AERODYNAMIC DRAG ON SPIKED BLUNT BODIES IN LOW-DENSITY HYPERSONIC FLOW,
by William H. Sims and Jerry S. Hahn. Aug 64, 39p
Contract AF40 600 1000, Proj. 8953, Task 895306
AEDC TDR64 160

Unclassified report

Descriptors: (*Spikes, Blunt bodies), (*Blunt bodies, Aerodynamic characteristics), (*Aerodynamic characteristics, Blunt bodies), (*Hypersonic flow, Nitrogen), Density, Drag, Model tests, Conical bodies, Cylindrical bodies, Reynolds number, Transport properties, Angle of attack, Correlation techniques, Wind tunnels.

Aerodynamic drag on spiked blunt bodies was measured in hypersonic, low-density flow of nitrogen. Two models were tested: a spherically capped cone of 10-deg half-angle at 0 < alpha < 40 deg, and a right circular cylinder at alpha = 0. Reynolds numbers, based on total body lengths and free-stream conditions, varied from 200 to 1200. Mach number was constant at 10.1. Results were compared with modified Newtonian and free-molecule calculations. Effects of hypersonic rarefied flow are apparent, with drag coefficient increasing for large angles of attack for all spike lengths. A correlation procedure suggested in an earlier report for a large class of similar bodies at 0-deg angle of attack is shown to be effective in the case of spiked bodies too. It is apparent that the marked reduction of drag effected by use of spikes on blunt-nosed bodies at higher Reynolds numbers is greatly diminished when low Reynolds numbers exist. However, a moderate reduction is shown for small angles of attack at the Reynolds numbers of the present experiment. (Author)

AD-603 585 Div. 9, 25
OTS Prices: HC $1.00/MF $0.50

Cincinnati Univ., Ohio.
REFERENCE TEMPERATURE METHOD FOR COMPUTING DISPLACEMENT THICKNESS.
Rept. for Oct 63-Mar 64,
by M. Saarlas. Aug 64, 37p
Contract AF33 616 8453, Proj. 7064
ARL 64 119

Unclassified report

Descriptors: (*Boundary layer, Measurement), (*Temperature, Boundary layer), Fluid flow, Fluid dynamic properties, Thickness, Specific heat, Distribution, Viscosity, Thermodynamics, Numerical analysis.

Computation of the boundary layer parameters with variable fluid properties is investigated in this report. In particular, calculation of boundary layer displacement thickness is studied in the cases where the variation of the temperature across the boundary layer necessitates consideration also of variation of the specific heats inside the boundary layer. This problem is of considerable significance in computation of viscous interaction effects at high Mach numbers. Since exact computation of the displacement thickness, with variable fluid properties, is extremely cumbersome, an approximate method is given here which permits evaluation of an effective specific heat and determines the displacement thickness in closed form. (Author)

AD-603 589 Div. 9
OTS Prices: HC $4.00/MF $0.75

Navy Electronics Lab., San Diego, Calif.
FLOW NOISE STUDY OF WATER FLOWING THROUGH PIPES.
Research rept.
by P. O. Laitinen. 13 May 64, 101p
Proj. SR011 01 01, Task 0401
NEL 1223

Unclassified report

Descriptors: (*Turbulence, Acoustic properties), (*Fluid flow, Acoustic properties), (*Pipes, Acoustic properties), Noise, Brass, Glass, Plastics, Harmonic analysis, Numerical analysis, Pressure, Shear stresses, Hydrophones, Experimental data, Sound, Velocity, Broadband, Reynolds number, Ship noise.

Sound pressure fluctuations produced by the turbulent flow of water through 0.494-inch ID pipe of glass, plastic, and brass were measured at controlled flow rates from 0.65 to 9.6 fps, in the absence of extraneous noise. Hydrophone pickups, pipe wall fluctuations, and pressure differential along the boundary layer were recorded, reduced to quantitative graphic form, and were analyzed by harmonic and numerical methods. Broadband magnitudes were related to Reynolds numbers, pressure spectra were derived, and autocorrelations and power spectra were related. Theoretical methods for computing values of water flow noise were compared with quantitive findings, and a method for approximating the magnitude of flow noise for a range of conditions was derived. (Author)

AD-603 621 Div. 9
OTS Prices: HC $1.50/MF $0.50

Cincinnati Univ., Ohio.
SIMILARITY RULES OF THE FLOW OF A PERFECTLY CONDUCTING GAS WITH AN ALIGNED MAGNETIC FIELD.
Interim technical rept.,
by Kinzo Hida. Jul 64, 54p
Contract AF33 616 8453, Proj. 7064
ARL 64 113

Unclassified report

Descriptors: (*Gas flow, Magnetic fields), (*Two-dimensional flow, Magnetic fields), Transonic flow, Compressible flow, Slender bodies, Shock waves.

Two-dimensional steady flows of an inviscid, compressible, perfectly conducting gas with an aligned magnetic field are classified into several regimes, depending on the values of the Mach number, M, and the Alfvenic Mach number, A. Similarity rules for the flow past a slender body are obtained for the purely elliptic or hyperbolic flow and the various transitional regimes such as transonic, (M = 1), trans-Alfvenic (A = 1) and hypercritical flows (M square + A square = 1). Special references are made to the shock relation and critical shock polars are found in each transition region. Flows near the point of intersection of any two of these transition lines are characterized by a pair of similarity parameters in each case. (Author)

AD-603 628 Div. 9, 15
OTS Prices: HC $2.00/MF $0.50

Kraichnan (Robert H.), Peterborough, N. H.
KOLMOGOROV'S HYPOTHESES AND EULERIAN TURBULENCE THEORY.
Research rept. no. 6,
by Robert H. Kraichnan. Jun 64, 35p
Contract Nonr4307 00, Proj. NR062 309

Unclassified report

length to diameter ratios in the Reynolds Number range of 10,000 to 100,000. (Author)

AD-603 829 Div. 9, 12
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
LIFT ON INCLINED BODIES OF REVOLUTION IN HYPERSONIC FLOW,
by G. Grimminger, E. P. Williams, and G. Young.
Rev. 17 Apr 50, 33p P-87
Unclassified report

Descriptors: (*Lift, Bodies of revolution), (*Bodies of revolution, Hypersonic flow), (*Hypersonic flow, Bodies of revolution), Guided missiles, Aerodynamic characteristics, Theory, Numerical analysis, Experimental data, Correlation techniques, Supersonic flow, Conical bodies, Angle of attack.

The importance of body lift lies in the fact that at moderate angles of attack and high Mach number it can constitute an appreciable part of the total lift of a winged missile. In this paper an attempt has been made to analyze body lift in hypersonic flow by an approximate method and, together with a correlation of existing experimental data, to indicate the probable variation of body lift over a wide range of Mach number extending from low supersonic to hypersonic. The method of analysis of hypersonic flow over inclined bodies of revolution employed herein has been denoted as the hypersonic approximation. It is an improvement on the Newtonian corpuscular theory of aerodynamics since it considers the centrifugal forces resulting from the curved paths of the air particles in addition to the impact (Newtonian) forces. (Author)

AD-603 891 Div. 9, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON AN EQUATION OCCURRING IN THE HARMONIC ANALYSIS OF VISCOUS FLUID FLOW,
by Richard Bellman. 12 Sep 50, 10p P-174
Unclassified report

Descriptors: (*Fluid flow, Harmonic analysis), (*Harmonic analysis, Equations), Nonlinear differential equations, Integral equations, Two-dimensional flow, Incompressible flow, Theorems, Functions, Viscosity.

AD-603 920 Div. 9, 12
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
THE COMPRESSIBLE BOUNDARY LAYER,
by George B. W. Young and Earl Janssen.
1 Jun 51, 65p P-214
Unclassified report

Rept. on Proj. RAND. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Laminar boundary layer, Compressible flow), Guided missiles, Differential equations, Thermal conductivity, Air, Hypersonic flow, Flat plate models, Heat transfer, Fluid dynamic properties, Turbulent boundary layer, Shear stresses, Temperature, Aerodynamic characteristics, Viscosity.

The laminar boundary layer equations in integral form as obtained by Moore are solved on the mechanical differential analyzer. The method of analysis permits the use of the best known variation of the air properties with temperature. Solutions are obtained for Mach numbers ranging from incompressible speeds to the hypersonic regime at ambient temperatures of 100, 400 and 800 R for both insulated plate and heat transfer cases. From these results an approximate design procedure for the calculation of the characteristics of both the laminar and turbulent boundary layers is obtained and presented as an aid to missile designers. (Author)

AD-603 961 Div. 9
OTS Prices: HC $1.00/MF $0.50

Institute of Engineering Research, Univ. of California, Berkeley.
FREQUENCY EFFECTS IN PANEL FLUTTER OF CYLINDRICAL SHELLS,
by R. A. Brown and M. Holt. Mar 64, 23p AS-64-6
Grants AFOSR268 64 and NSF GP2103
Unclassified report

Descriptors: (*Flutter, Frequency), (*Panels (Structural), Structural shells), Cylindrical bodies, Aerodynamic loading, Pressure, Supersonic flow, Numerical analysis, Equations, Airplane panels, Aeroelasticity.

The expression for the pressure coefficient on a vibrating cylindrical shell of finite length in unsteady supersonic flow is simplified. The expression is valid at high values of Mach number and is based on the quasi-steady approximation when only first order terms in vibration frequency are considered. The kernel functions arising in the expression for the pressure coefficient are tabulated and shown graphically for a series of circumferential modes. It is anticipated that the revised expression will be simpler to use than the earlier expression when introduced into the full panel flutter equations. (Author)

AD-603 962 Div. 9
OTS Prices: HC $2.00/MF $0.50

Institute of Engineering Research, Univ. of California, Berkeley.
CALCULATIONS OF SUPERSONIC FLOW PAST YAWED CONES BY THE METHOD OF INTEGRAL RELATIONS,
by M. Holt and S. C. Lee. Mar 64, 28p AS-64-7
Grants AFOSR268 64 and NSF GP2103
Unclassified report

Descriptors: (*Supersonic flow, Mathematical analysis), (*Shock waves, Supersonic flow), Shock (Mechanics), Geometric forms, Angle of attack, Yaw, Integral equations.

The method of integral relations, as applied to the yawed cone problem by Chushkin and Shchennikov, is modified to take account of the entropy singularity on the leeward side of the cone. It is proposed to apply the method in two regions, in the quadrant adjacent to the singular generator and in the remaining quadrant including the cone surface and the shock. Results are not yet complete but those obtained so far suggest that the modification will give a more realistic picture of the flow between the cone and the shock. (Author)

AD-604 008 Div. 9
OTS Prices: HC $4.00/MF $1.00

Polytechnic Inst. of Brooklyn, N. Y.
TURBULENT TRANSPORT PROPERTIES FOR AXISYMMETRIC HETEROGENEOUS MIXING.

with a cylindrical free molecule probe aligned with the flow. Measurements made in flowing gases with other types of Langmuir probes are subject to certain consistent errors. (Author)

AD-603 669 Div. 9, 15
OTS Prices: HC $3.00/MF $0.75

Institute of Engineering Research, Univ. of California, Berkeley.
THE BASE FLOW PROBLEM AT VERY LOW REYNOLDS NUMBER IN THE STOKES APPROXIMATION,
by Henri Viviand and Stanley A. Berger. 18 Jun 64, 76p AS-64-10
Contract Nonr222 45

Unclassified report

Descriptors: (*Base flow, Reynolds number), (*Reynolds number, Base flow), Fluid flow, Incompressible flow, Two-dimensional flow, Axially symmetric flow, Wake, Fluid flow, Partial differential equations, Numerical analysis, Graphics.

The general solutions of the Stokes approximate equations of motion are derived for two-dimensional and axisymmetric flows in the half-space $x > 0$, for an arbitrarily given velocity field in the plane $x = 0$. There is assumed to be no solid surface in the half-space. According to whether the velocity at infinity is zero or not, the solutions can be said to describe either jet type or wake type flows. Only the latter category is considered; numerical examples are worked out and properties of the base flow at very low Reynolds numbers are investigated. A recirculating flow region may exist, but the flow properties are not sensitive to this feature. (Author)

AD-603 723 Div. 9
OTS Prices: HC $3.00/MF $0.50

Institute of Tech., Univ. of Minnesota, Minneapolis.
THEORETICAL PARACHUTE INVESTIGATIONS.
Progress rept. no. 19, 1 Sep-30 Nov 61,
by H. G. Heinrich, T. Riabokin, S. K. Ibrahim, E. L. Haak, and R. J. Niccum. 30 Nov 61, 54p
Contract AF33 616 8310, Proj. 6065, Task 60252

Unclassified report

Descriptors: (*Parachutes, Aerodynamic characteristics), (*Aerodynamic characteristics, Parachutes), Subsonic flow, Supersonic flow, Drag, Wake, Turbulence, Wind tunnels, Deceleration, Mathematical analysis.

Contents: Investigation of wake effects on the behavior of parachutes and other retardation devices behind large bodies at subsonic and supersonic speeds; Investigation of basic stability parameters of conventional parachutes; Theoretical study of supersonic parachute phenomena; Theoretical analysis of the dynamics of the opening parachute; Statistical analysis of extraction time, deployment time, opening time, and drag coefficient for aerial delivery parachutes and systems; Basic principles of new parachutes and retardation devices; Gliding aerodynamic decelerator; Ribbon grids for supersonic flow; Flow patterns of aerodynamic decelerators; Stress analysis of the T-10 troop parachute.

AD-603 750 Div. 9
OTS Prices: HC $2.00/MF $0.50

Southwest Research Inst., San Antonio, Tex.
A CRITICAL RE-EVALUATION OF HYDRODYNAMIC THEORIES AND EXPERIMENTS IN SUBCAVITATING HYDROFOIL FLUTTER.
Technical rept.,
by Wen-Hwa Chu. Jun 64, 36p
Contract NObs88599, Proj. 02 1371

Unclassified report

Descriptors: (*Hydrofoils, Hydrodynamics), (*Flutter, Cavitation), Boundary layer, Airfoils, Oscillation, Loading (Mechanics), Fluid dynamic properties, Wind tunnels, Mathematical prediction.

A review of relevant hydrodynamic information was made, with emphasis on the possible cause of serious discrepancies between classical hydrodynamic theory and experiments for subcavitating hydrofoils. The usefulness of the best available wind tunnel and towing tank force measurements is also discussed. It is believed that these data are unreliable, and that the completion of the force calculation based on the classical lifting surface theory and subsequent flutter prediction for an actual flutter model is desirable. Some recommendations for possible future experimental research are also given. (Author)

AD-603 754 Div. 9
OTS Prices: HC $2.00/MF $0.50

Southwest Research Inst., San Antonio, Tex.
CORRELATION OF VARIOUS SUBCAVITATING HYDROFOIL FLUTTER PREDICTIONS USING MODIFIED OSCILLATORY LIFT AND MOMENT COEFFICIENTS.
Technical rept.,
by H. Norman Abramson and Carl G. Langner.
Jun 64, 41p
Contract NObs88599, Proj. 68 1371 2

Unclassified report

Descriptors: (*Hydrofoils, Hydrodynamics), (*Flutter, Cavitation), Mathematical prediction, Velocity, Oscillation, Models (Simulations), Lift.

Flutter calculations were performed for a simple unswept cantilever subcavitating hydrofoil using theoretical two- and three-dimensional oscillatory coefficients, measured three-dimensional oscillatory coefficients, and various modifications of these coefficients. Conclusions based on comparisons of these calculations with the observed flutter speed are that theoretical predictions of hydrofoil flutter can be highly unconservative, indicating the need for more satisfactory flutter prediction techniques and reliance on flutter model testing. (Author)

AD-603 778 Div. 9
OTS Prices: HC $2.00/MF $0.50

Hydraulic Engineering Lab., Univ. of Texas, Austin.
DRAG FORCES IN VELOCITY GRADIENT FIELDS.
Interim technical rept.,
by Charles Dalton and Frank D. Masch. Mar 64, 49p
HYD-04-6401
Contract Nonr375 16

Unclassified report

Descriptors: (*Drag, Cylindrical bodies), (*Cylindrical bodies, Drag), Hydrodynamics, Fluid flow, Velocity, Water tunnels, Transducers, Boundary layer, Reynolds number.

The report presents work completed to date on an investigation of drag forces on cylinders in linear velocity gradient fields. Theoretical consideration is given to the flow field which develops at the cylinder under the influence of the gradient. Limited experimental data were processed which shows the local drag coefficient is low in regions where the velocity is high and is high where the velocity is low. Average drag coefficients were found to be greater than the conventional value of 1.2 at low cylinder

A method of numerical solution of the basic gas dynamic equations involving suspended solids is presented for the case of an arbitrary area distribution. The velocity of sound in the two-phase mixture was computed. The importance of the throat condition is clarified and the inadequacy of solutions without the throat condition is discussed. The numerical solution and the exact solution are presented for comparison. The complete program using the Runge-Kutta-Gill method is given in detail. (Author)

AD-604 111 Div. 9
OTS Prices: HC $2.00/MF $0.50

Palmer Physical Lab., Princeton Univ., N. J.
INTERFEROMETRIC STUDY OF SUPERSONIC PHENOMENA. PART III. BOUNDARY LAYER AND SHOCK WAVE INTERACTIONS OBSERVED ALONG PROBES AND WIRES IN SUPERSONIC AIR STREAMS,
by J. Winckler. 19 Feb 47, 32p
Contract NOrd9240
NAVWEPS 7-47

Unclassified report

Descriptors: (*Gas flow, Optical analysis), (*Supersonic flow, Axially symmetric flow), Shock waves, Boundary layer, Jets, Air, Density, Distribution, Orifices, Nozzles, Wire, Probes (Electromagnetic), Interferometers.

In earlier reports (PB-118 682 and AD-604 112) of this series it was shown how quantitative values of density, pressure, temperature, velocity and Mach number in supersonic gas streams could be obtained optically by the use of an interferometer. The Mach number M may be obtained independently by making shadow photographs of the head wave of a narrow probe placed in the stream. Probe and interferometer Mach number values were in good agreement in a homogeneous stream from a Laval nozzle, but in complete disagreement in an inhomogeneous expanding air jet in the region where standing shock waves occur. This discrepancy was traced to the influence of the standing shocks on the air flowing at low velocity in the boundary layer along the probe. The shock pressure may cause a separation of the stream from the probe, and a configuration of normal and oblique shocks arises as a result at the region of separation. Further experiments made in a strictly one-dimensional stream show an analagous separation of flow when a normal standing shock wave intercepts the boundary layer. The theory of separation is discussed. This report includes the details of the methods of applying the Mach interferometer to an axially symmetric flow pattern. The density distribution in such an air jet from a circular orifice was determined. (Author)

AD-604 112 Div. 9
OTS Prices: HC $4.00/MF $1.00

Palmer Physical Lab., Princeton Univ., N. J.
INTERFEROMETRIC STUDY OF SUPERSONIC PHENOMENA. PART I. A SUPERSONIC AIR JET AT 60 LB/SQ IN TANK PRESSURE,
by R. Ladenburg, C. C. Van Voorhis, and J. Winckler.
17 Apr 46, 132p
Contract NOrd9240
NAVWEPS 69 46

Unclassified report

Descriptors: (*Supersonic flow, Jets), (*Gas flow, Optical analysis), Compressed air, Pressure, Temperature, Density, Orifices, Interferometers.

The report is the first of a series describing optical, especially interferometric studies, of supersonic phenomena. A discussion of a Zehnder-Mach interferometer is given, showing the way fringes are produced, and the effect of various fringe widths and orientations. A supersonic air jet from a 10-mm diameter streamlined orifice at 60 lb./ sq. in. tank pressure was analyzed. Pressures, temperatures, Mach numbers, and velocities were calculated from the density values in the jet and the initial conditions. Shock strengths, entropy changes, and conditions at the orifice and slip stream are found generally in good agreement with theory. (Author)

AD-604 127 Div. 9, 1
OTS Prices: HC $5.00/MF $1.00

Catholic Univ. of America, Washington, D. C.
A METHOD FOR NUMERICAL CALCULATION OF SLIPSTREAM CONTRACTION OF A SHROUDED IMPLUSE DISC IN THE STATIC CASE WITH APPLICATION TO OTHER AXISYMMETRIC POTENTIAL FLOW PROBLEMS,
by Harvey R. Chaplin, Jr. Jun 64, 165p
DTMB 1857; DTMB Aero 1077

Unclassified report

Prepared as a dissertation for Ph.D.

Descriptors: (*Shroud rings, Aerodynamic characteristics), (*Shrouded propellers, Theory), (*Axially symmetric flow, Numerical analysis), Disks, Cylindrical bodies, Conical bodies, Parabolic bodies, Vortices, Propellers (Aerial), Effectiveness, Thrust, Momentum, Bodies of revolution, Ring wings, Ducts, Jet engine inlets, One-dimensional flow.

The problem of the axisymmetric flow of an ideal incompressible fluid through an impulse disc bounded by a thin shroud is considered. A systematic calculation procedure is developed, suitable for use on a large electronic digital computer. The results of calculations of the slipstream contraction ratio, in the static case, for cylindrical, conical, and parabolic-cambered shrouds, are presented. It is found that the slipstream contracts less severely, in the case of very short cylindrical shrouds, than had previously been supposed. Also for cylindrical shrouds, it is found that an excellent estimate of the slipstream contraction ratio can be obtained from a comparatively brief calculation. The method of calculation is also applicable to axisymmetric flows about (a) shrouded impulse discs at finite thrust coefficients, (b) circular inlets, and (c) arbitrary annular and solid bodies of revolution. Internal flows within circular ducts can be closely approximated by the internal flows within very long shrouds. A few calculative results are presented to illustrate these applications.

AD-604 130 Div. 9
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THERMAL STRESSES IN CONICAL SHELLS,
by J. H. Huth. 12 Jun 52, 14p P-304

Unclassified report

Descriptors: (*Conical bodies, Thermal stresses), (*Aerodynamic characteristics, Conical bodies), Pressure, Temperature, Laminar boundary layer, Guided missiles, Equations, Differential equations, Integrals, Bessel functions.

The paper considers the stresses in a conical shell of revolution resulting from aerodynamic pressure and thermal gradients. In particular the results are applicable to the conical tip of a missile flying at zero angle of

Interim technical rept.
by Victor Zakkay, Egon Krause, and Stephen D. L. Woo.
Jun 64, 129p
Contract AF33 616 7661, Proj. 7064, Task 706401
ARL 64 103

Unclassified report

Descriptors: (*Jet mixing flow, Transport properties), Subsonic flow, Supersonic flow, Turbulence, Hydrogen, Helium, Argon, Air, Mixtures, Viscosity, Differential equations.

An experimental investigation of the turbulent mixing of two dissimilar gases for both subsonic and supersonic flows is presented. This investigation was carried out in order to determine the turbulent transport coefficients for hydrogen-, helium-, and argon-air mixtures in the mixing region of two coaxial jets. The basic differential equations describing the mean flow properties are solved for the transport coefficients. The convective derivatives which are needed in the solution of the equations are determined from the velocity and concentration profiles measured in the experiments. Values of the eddy viscosity, turbulent diffusion coefficient, and Lewis number were evaluated in this manner and the eddy viscosity so obtained is then compared with existing formulations. A new formulation for the eddy viscosity is then given whereby existing theories may still be used in analyzing the mixing process. Finally, the influence of similar velocity and concentration profiles on the transport properties is discussed and similarity parameters in both axial and radial directions are then shown to be valid for various injected gases. (Author)

AD-604 036 Div. 9
OTS Prices: HC $4.00/MF $0.75

Aeronautical Research Associates of Princeton, Inc., N. J.
THE EFFECT OF SURFACE PERTURBATIONS ON THE PRESSURE DISTRIBUTIONS ABOUT BLUNT TWO-DIMENSIONAL BODIES AT HIGH MACH NUMBERS,
by Coleman duP. Donaldson, Roger D. Sullivan, and Wallace D. Hayes. Apr 64, 104p
Contract AF33 657 7313, Proj. 8219, Task 821902
FDL TDR64 17

Unclassified report

In cooperation with Grumman Aircraft Engineering Corporation, Bethpage, N. Y.

Descriptors: (*Blunt bodies, Pressure), (*Airfoils, Pressure), Hypersonic flow, Distribution, Aerodynamic control surfaces, Aeroelasticity, Flat plate models, Flaps, Wedges, Surface properties.

A method which is simpler and easier to apply than the general method of characteristics is developed for computing the pressure distributions about blunt bodies at high Mach number. The method presented enables one to compute the change in pressure distribution that results when a basic shape whose pressure distribution and flow field are known is perturbed in some manner, either by deflection of a control surface or by an aeroelastic deformation. In order to illustrate the character of this perturbation problem, the linearized theory of the pressure distribution upon a perturbed flat plate above which exists an entirely supersonic entropy layer is developed in some detail and applied to the special case of the computation of flap effectiveness on blunt wedge airfoils at infinite Mach number. With the background of these results from the linearized theory, the more general problem is discussed and an empirical method is suggested for computing the pressure distribution about a perturbed basic shape whose pressure distribution and flow field are known. The method is then used to compute the pressure distribution about a blunt two-dimensional airfoil for which theoretical and experimental pressure distributions have been obtained at M = 5 and M = approx. 8. Comparison of the method with both exact theory and experimental results shows satisfactory agreement for this particular case. (Author)

AD-604 061 Div. 9, 25
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
A SOLUTION OF THE LAMINAR BOUNDARY LAYER EQUATIONS FOR A COMPRESSIBLE FLUID WITH VARIABLE PROPERTIES, INCLUDING DISSOCIATION.
Master's thesis,
by L. L. Moore. 12 Jan 49, rev. 1 Nov 51, 80p P-50

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy

Descriptors: (*Flat plate models, Compressible flow), (*Laminar boundary layer, Equations), Heat transfer, Heat transfer coefficients, Air, Dissociation, Friction, Nonlinear differential equations, Partial differential equations.

The laminar boundary layer equations are solved for a flat plate in compressible flow where equilibrium dissociation of the air is assumed as well as variable air properties. Evaluation of the skin friction and heat transfer characteristics is made for a Mach number range 1 to 20. Both the insulated plate without radiation and the plate with heat transfer are considered. (Author)

AD-604 103 Div. 9
OTS Prices: HC $3.00/MF $0.75

Hydrodynamics Lab., Mass. Inst. of Tech., Cambridge.
TURBULENT WAKES IN DENSITY STRATIFIED FLUIDS OF FINITE EXTENT.
Rept. no. 65,
by Edmund A. Prych, Frederick R. Harty, Jr., and John F. Kennedy. Jul 64, 96p MIT-DE-R64-26, DSR-8800
Contracts Nonr1841 76, Nonr1841 59

Unclassified report

Descriptors: (*Wake, Turbulence), (*Underwater objects, Fluid dynamic properties), Flat plate models, Drag, Momentum, Density, Diffusion, Flow visualization, Water tunnels.

Results are presented of an investigation of the effects of a free surface and density stratification of the turbulent transfer of mass and momentum in two-dimensional wakes. The effect of depth of submergence on the drag of a two-dimensional body was also investigated.

AD-604 107 Div. 9, 25
OTS Prices: HC $4.00/MF $0.75

Illinois Univ., Urbana.
NUMERICAL SOLUTION TO THE FLOW OF A GAS-SOLID SUSPENSION THROUGH A NOZZLE.
Technical rept.,
by John A. Hultberg. Aug 64, 101p ILL-17-R
Contract Nonr3623 00, Proj. NR098 038

Unclassified report

Rept. on Proj. Squid

Descriptors: (*Aerosols, Fluid dynamic properties), Nozzle gas flow, Equations, Numerical analysis, Sound transmission, Programming (Computers).

both the ORDVAC and the IBM-701 high speed compufers, and was repeated both with an ideal gas assumption and with a more detailed equation of state. A study was made of the effects of such factors as the shock width, the initial shock strength, the space and time grid sizes, the sphericity, the stability, the loss of significance and some other features of the numerical computation. (Author)

AD-604 291 Div. 9
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SUPERSONIC FLOW AROUND CONES AT LARGE YAW, by G. B. W. Young and C. P. Siska. Rev. 6 Aug 51, 43p P-198

Unclassified report

Descriptors: (*Supersonic flow, Equations), (*Conical bodies, Supersonic characteristics), Bodies of revolution, Angle of attack, Yaw, Drag, Mach number, Shock waves.

Equations were developed for the flow properties in the region bounded by a supersonic cone body at large angle of attack and its attached shock wave, for use with the tabulations of Kopal. A comparison of the theoretical results is made with the experimental data of Cronvich. A slight discrepancy which increases with increasing Mach number was found in the value of K sub DYH, the yawing head drag as tabulated by Kopal. (Author)

attack; a numerical example is given for a temperature distribution typical of a laminar boundary layer. It is concluded that from the standpoint of eliminating high stresses, large temperature gradients both along a ray and across the shell thickness are most undesirable. (Author)

AD-604 193 Div. 9
OTS Prices: HC $4.00/MF $1.00

University of Southern California, Los Angeles. Engineering Center.
STUDIES IN THE HEATING OF A SUPERSONIC GAS STREAM BY A RADIO FREQUENCY DISCHARGE,
by Frederick O. Smetana. 15 Jul 60, 139p
USCEC-56-214
Contracts AF18 603 95, AF40 600 857
AFOSR TN60 648 PB 149 958

Unclassified report

Also partly supported by the Office of Naval Research.

Descriptors: (*Supersonic flow, Heating), (*Radio waves, Heating), Gas flow, Radiofrequency, Nozzle gas flow, Calorimeters, Nitrogen, Argon, Recombination reactions, Interferometers, Spectroscopy, Halogenated hydrocarbons, Fluorides.

The background and problem areas of the application of radio frequency discharge to heating a supersonic gas stream are discussed. An apparatus was constructed to permit the effectiveness of this technique to be studied by calorimetry. Results indicate that about 10% of the power taken from the a.c. line appeared as heat in the gas. Through modifications in the electrical circuitry this probably can be increased to 15%. This technique introduces a negligible percentage of unwanted contaminants. On the other hand, small quantities of C4F8 mixed with N2 were found to decrease the N2 recombination time substantially. Tests were also made using argon alone and mixed nitrogen. Maximum gas temperatures at the end of the nozzle were obtained with argon alone, being 660K. Limited spectroscopic and microwave interferometer investigations were also conducted. (Author)

AD-604 213 Div. 9
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE STABILITY OF FLUID FLOWS WITH SPHERICAL SYMMETRY,
by M. S. Plesset. 15 Apr 53, rev. 28 Sep 53, 10p P-395
Contract W7405eng48
AECU 2997

Unclassified report

Prepared under sub-contract with the Regents of the Univ. of Calif.

Descriptors: (*Fluid flow, Stability), Surface properties, Spheres, Incompressible flow, Motion, Mathematical analysis.

The conditions for the stability or instability of the interface between two immiscible incompressible fluids in radial motion are deduced. The stability conditions derived by Taylor for the interface of two fluids in plane motion do not apply to spherical flows without significant modifications. (Author)

AD-604 215 Div. 9
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
EFFECTS OF SURFACE TENSION AND VISCOSITY ON TAYLOR INSTABILITY,
by Richard Bellman and Ralph H. Pennington. 15 May 53, 28p P-403

Unclassified report

Descriptors: (*Surface tension, Stability), (*Viscosity, Stability), Fluid flow, Fluid dynamic properties, Incompressible flow, Surface properties, Acceleration, Mathematical analysis.

The model used is that of two fluids of infinite depth, with the interface initially in the form of a sine wave with amplitude small compared to wave length. The fluids are considered incompressible, and only the linear terms in the equations of hydrodynamics are used. The first four sections discuss the effects of surface tension and viscosity. The fifth gives a few numerical results to illustrate the main points of the preceding sections. (Author)

AD-604 252 Div. 9
OTS Prices: HC $3.00/MF $0.75

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
DIRECT MEASUREMENT OF VELOCITY DISTRIBUTION FUNCTIONS,
by E. P. Muntz. Aug 64, 62p R64SD59
Contract AF49 638 1152

Unclassified report

Descriptors: (*Superaerodynamics, Velocity), (*Statistical functions, Measurement), Gas flow, Molecular properties, Electrons, Excitation, Spectroscopy, Doppler effect.

A method for measuring velocity distribution functions in rarefied gas flows was investigated. The technique is a direct determination, accurate to within one percent, which does not significantly disturb the flow under investigation. It is shown that accurate measurements can be made of the Doppler profile of emission lines excited by an electron beam. The method depends upon the tendency of high energy electrons to transfer relatively little momentum to the nuclei when they excite the electronic levels of gas molecules. The technique presented could be used in the study of normal shock waves and other investigations in rarefied gas dynamics research. (Author)

AD-604 281 Div. 9
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NUMERICAL SOLUTION OF A SPHERICAL BLAST WAVE,
by Harold L. Brode. 10 Nov 53, 26p P-452

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Shock waves, Numerical analysis), Blast, Special functions (Mathematics), Pressure, Density, Velocity, Gases, Equations of state, Stability, Differential equations.

The strong shock, point source, similarity solution was used as initial conditions in a numerical integration of the differential equations of gas motion in Lagrangean form. The technique which introduces an artificial viscosity was employed. The solutions were carried from two thousand atmospheres down to one tenth atmospheres peak overpressure. Results include pressure, density, particle velocity, and position as functions of time over a graduated space grid of ninety divisions. The problem was coded for

pending system checkout and analysis of initial experimental results. The overall objective of the investigation is to gather experimental data and develop a theoretical analysis for the heat transfer characteristics of hot gas flow from both head-end and aft-end igniters in solid propellant motor systems. (Author)

AD-603 852 Div. 10, 1, 16
OTS Prices: HC $6.00/MF $1.50

Southwest Research Inst., San Antonio, Tex.
A STUDY OF EXISTING BASE FUEL HANDLING PROCEDURES IN RELATION TO MICROBIAL CONTAMINATION.
Rept. for 24 Sep 62-8 Apr 64,
by Robert K. Johnston, F. W. Bieberdorf, R. G. Weichlein, J. C. Tyler, and R. D. Brown. Jun 64, 278p
Contract AF33 657 9762, Proj. 8169, Task 816906
SEG TDR64 29

Unclassified report

Descriptors: (*Biological contamination, Jet engine fuels), (*Jet engine fuels, Biological contamination), (*Fuel additives, Corrosion inhibition), (*Fuel contamination, Handling), Aviation fuels, Antioxidants, De-icing materials, Sea water, Fungus deterioration, Pseudomonas aeroginosa, Proteus, Fuel filters, Refueling, Steel, Aluminum, Epoxy plastics, Furan resins, Air force, Alchols, Microorganisms.

A survey of the JP-4 fuel handling facilities and procedures at three Air Force bases has indicated no serious contamination, microbial or otherwise. The water bottoms throughout the fuel systems were either sterile or contained very few microorganisms, with appreciable counts observed only on a single sample from each base. The general housekeeping and observance of prescribed fuel handling procedures appeared adequate. Experimental studies were made of microbial growth in 4000-gallon tanks and in 15-gallon drums, in which JP-4 fuel was stored over dilute sea water with varying proportions of glycerin and methoxyethanol, inoculated with selected microorganisms. Effective inhibition of growth was observed in water bottoms containing 20% methoxyethanol, and some inhibition with 10% methoxyethanol; lower concentrations allowed vigorous growth. It was found that the addition of 20% methoxyethanol effectively sterilized the contents of a tank in which growth was already established. (Author)

AD-603 871 Div. 10, 22
OTS Prices: HC $2.00/MF $0.50

Mining Research Lab., Colorado School of Mines, Golden.
EXPERIMENTAL DETERMINATION OF MECHANICAL RESPONSE OF SOLID ROCKET PROPELLANT UNDER HIGH STRAIN RATE AND LOW TEMPERATURE.
Final rept.,
by Richard S. Culver and John S. Rinehart.
15 Jul 64, 48p MRL-ONR-3
Contract Nonr3774 00FMB

Unclassified report

Descriptors: (*Solid rocket propellants, Mechanical properties), Isocyanate plastics, Elastomers, Thermal properties, Tensile properties, Fracture (Mechanics), Shock (Mechanics), Attenuation, Deformation, Compressive properties.

Described are the results of an experimental investigation of the mechanical properties of two simulated solid rocket propellants. The 'green' propellant is salt-filled polyurethane; the 'gray' propellant is Adiprene L-100, filled with aluminum powder, aluminum sulphate, and castor oil. For the green propellant, the U. T. S. varied from 170 psi at room temperature to about 6,000 psi at -200C, while corresponding values for the gray were 250 psi and 11,000 psi, respectively. The impulsive fracture strength of the green propellant was found to be about 16,000 psi and the shock attenuation at this stress level is about 5,000 psi/in. An approximate value of 24,000 psi for the impulsive fracture strength of the gray was obtained by indirect menas, along with a shock attenuation of 1,500 psi/in. The dynamic Poisson's ratio for the green propellant was found to be greater than 0.5, while for the gray, it was less than 0.5. (Author)

AD-604 019 Div. 10, 14, 25
OTS Prices: HC $5.00/MF $1.00

Columbia Univ., New York.
RHEOLOGICAL BEHAVIOR OF A FILLED ELASTOMER.
Technical rept. no. 23
by E. M. Lenoe, R. A. Heller, and A. M. Fruedenthal.
Jun 64, 106p
Contract Nonr266 78, Proj. NR064 446

Unclassified report

Descriptors: (*Solid rocket propellants, Models (Simulations)), (*Elastomers, Mechanical properties), (*Isocyanate plastics, Mechanical properties), Potassium compounds, Chlorides, Loading (Mechanics), Viscoelasticity, Compressive properties, Stresses, Strain (Mechanics).

Rheological behavior of a filled elastomer consisting of a polyurethane rubber and granular potassium chloride was investigated with both long- and short-time loading producing conditions of torsion, uniaxial tension and compression. The volumetric response of the elastomer was also studied. To represent the observed behavior for moderate stresses and strains a linear viscoelastic model is developed. The results of torsion relaxation tests performed on an inert solid propellant are presented for three strain levels over the temperature range -60F to +200F. (Author)

AD-604 109 Div. 10, 14
OTS Prices: HC $2.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
SOLID PROPELLANT MECHANICAL PROPERTIES INVESTIGATIONS.
Quarterly progress rept. no. 3 (Rept. no 9), 1 Apr-1 Jul 64,
by Norman Fishman and James A. Rinde. 4 Aug 64, 45p
Contract AF04 611 9559, Proj. PRU4673

Unclassified report

Descriptors: (*Solid rocket propellants, Mechanical properties), (*Elastomers, Mechanical properties), Models (Simulations), Isocyanate plastics, Alkenes, Ammonium compounds, Perchlorates, Aluminum, Elasticity, Strain (Mechanics), Equations, Humidity, Rupture, Shear stresses.

Equations of finite elastic theory based on Rivlin's I-invariants were developed and used to analyze propellant test results (See AD-439 403). A path-independent equation was developed interrelating volume ratio, strain energy, and time for each propellant composition. Futher, by using a reduced time expression, as adjusted by empirically determined shift factors, this dilatational state equation can be used to calculate dilatation from results of tests conducted at various temperatures and humidities. Interpolation can provide factors which will enable the prediction of dilatational behavior over the entire range of temperature and humidity studied. Constant volume envelopes were prepared from data of tests of both compositions con-

10. Fuels and Combustion

AD-603 520 Div. 10, 27
OTS Prices: HC $1.00/MF $0.50

Army Frankford Arsenal, Philadelphia, Pa.
FORM FUNCTIONS FOR DUAL COMPOSITION INCREMENTS OF PROPELLANT GRAINS,
by J. F. Kowalick and M. S. Silverstein. Sep 63, 23p
AFA R1692

Unclassified report

Descriptors: (*Rocket propellants, Propellant grains), (*Propellant grains, Burning rate), Functions, Combustion products, Mathematical models, Geometric forms.

It was demonstrated mathematically that any desired form function can be approached by the burning of increments or groups of dual composition propellant grains of neutral geometry (constant surface during burning). This scheduled burning was achieved by varying the thickness of each of the outer layers of propellant, with the outer layers having the lower burning rate. It was shown that the pertinent parameters are the total burning distance of the propellant system, the burning distance of grains in each increment of propellant, the number of groups or increments, the mass of each group, and the number of groups which are burning simultaneously. The relationship of these parameters to the desired form function is expressed as a series of equations, each of which is an incremental form function. The sum of the series approaches, to any desired degree of accuracy, the specified form function. (Author)

AD-603 631 Div. 10, 27
OTS Prices: HC $4.00/MF $1.00

General Electric Co., Cincinnati, Ohio.
EFFECT OF IMPURITIES OF CESIUM FUEL UPON ION ENGINES.
Rept. for 1 Jun 63-31 May 64,
by B. A. Free. Jun 64, 134p
Contract AF33 657 9163, Proj. 3048, Task 304804
ASD TDR63 476 P2

Unclassified report

Descriptors: (*Cesium, Fuels), (*Fuel contamination, Ion engines), (*Ion engines, Fuel contamination), Impurities, Sodium, Potassium, Oxygen, Ionization, Porous metals, Tungsten, Chemical reactions, Experimental data, Graphics.

This report deals with the effect of selected contaminants on the ionization behavior of cesium flowing through a porous tungsten surface. The measurement criterion is critical temperature, where the degree of ionization abruptly rises from a negligible level to a value approaching 100%. The impurities studied are sodium, potassium, and oxygen, all at the 0.3% levels. The effect of sodium and potassium is to raise the critical temperature, whereas oxygen has no effect. Flow rate studies over a limited range have shown that critical temperature is adversely affected by increased flow. An attempt to cancel the adverse effect of the alkali metal impurities by controlled oxygen addition indicated some success, but the effect observed may be within the limits of experimental error. A number of areas for future investigation are suggested. (Author)

AD-603 650 Div. 10, 1, 17
OTS Prices: HC $4.00/MF $1.00

Phillips Petroleum Co., Bartlesville, Okla.
EFFECT OF JP-5 PROPERTIES ON HOT GAS CORROSION AND FLAME RADIATION.
Summary rept.,
by R. M. Schirmer and E. W. Aldrich. Jun 64, 132p
PPC 3753 64R
Contract NOw63 0406d

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Jet engine fuels, Corrosion), (*Corrosion, Gas turbines), (*Aviation fuels, Combustion), (*Nickel alloys, Corrosion), (*Cobalt alloys, Corrosion), Sulfur, Sea water, Heat-resistant metals and alloys, Environmental tests, Flames, Combustion products, Chromium alloys, Molecular structure, Tensile properties, High-temperature research, High-pressure research, Performance (Engineering), Aircraft engines.

An experimental investigation was made to determine whether the maximum sulfur content of 0.4 weight per cent, currently allowed in grade JP-5 aviation turbine fuel, is a safe level for protection of the super-alloys used in high performance engines when operated in a marine environment. A second phase dealt with the effect of fuel molecular structure and volatility on the total radiant energy from combustor flames, which by contributing to the operating temperature of hot section components limits aircraft turbine engine power and durability.

AD-603 813 Div. 10, 9, 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SIMULATION OF COMBUSTION MODELS IN WIND TUNNELS,
by Bruno W. Augenstein. 27 Dec 48, 7p P-60

Unclassified report

Descriptors: (*Combustion, Simulation), (*Fluid flow, Ducts), Mathematical models, Wind tunnels, Specific heat, Thermodynamics, Functions, Equations.

An analysis is given of the extent to which duct flow with burning can be simulated without heat addition in a wind tunnel (i.e., a cold test). (Author)

AD-603 816 Div. 10, 25, 27
OTS Prices: HC $1.00/MF $0.50

Rocketdyne, Canoga Park, Calif.
A STUDY OF THE HEAT TRANSFER CHARACTERISTICS OF HOT GAS IGNITION.
Quarterly progress rept. no. 1 for period ending 31 Jul 64,
by L. W. Carlson, T. A. Coultas, L. Manson, and J. D. Seader. 7 Aug 64, 25p Rocketdyne-RM-1063/362
Contract AF04 611 9884

Unclassified report

Descriptors: (*Nitrogen, Ignition), (*Heat transfer, Rocket igniters), (*Rocket igniters, Heat transfer), Heaters, Solid rocket propellants, Rocket motors (Solid propellant), Rocket models, Model tests, Gas flow, Design.

Effort was directed towards design of a hot gas heater, detail design of test section components, procurement of materials, and hardware fabrication. The hot gas heater design makes possible step increases of pressure and temperature to both the transient and steady-state heat transfer test sections using clean hot gaseous nitrogen. Heater fabrication is nearly finished and final assembly is underway. All test section designs are now complete. All components are fabricated except those purposefully held back

12. Guided Missiles

AD-603 548 Div. 12, 27
OTS Prices: HC $5.00/MF $1.00

Rocketdyne, Canoga Park, Calif.
INVESTIGATION, DESIGN, AND TEST OF EXPERIMENTAL LIQUID HYDROGEN PUMPS.
Rept. for 15 Jun 63-1 Jun 64,
by Lyle Fuller. Jun 64, 188p Rocketdyne R-5730
Contract AF33 657 11165, Proj. 3145, Task 314501
APL TDR64 86

Unclassified report

Descriptors: (*Spacecraft, pumps), (*Pumps, Liquefied gases, Hydrogen), Rocket motors, Materials, Environmental tests, Design, Auxiliary power plants, Pistons, Cryogenics, Compatibility, Stainless steel, Plating, Chromium, Tin alloys Vapors, Bearings, Tests.

Accomplishments during a 12-month program on the investigation, design, and test of an experimental liquid hydrogen piston pump are covered in this report. Primary objectives on the program were: (1) the investigation of suitable materials for a pump with an extremely small piston-to-cylinder clearance using the hydrogen being pumped as the only lubricant and coolant, (2) a final design configuration to minimize piston side load, (3) to pump hydrogen at flowrates from 2 to 12 lb/hr at inlet qualities of 0 to 100 percent with a discharge pressure of 1200 psi, and (4) to achieve 300 hours of maintenance-free operation on one piston and cylinder assembly. Actual pump performance was compared with calculated theoretical performance. (Author)

AD-603 583 Div. 12, 15, 30
OTS Prices: HC $2.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
A MISSILE TARGETING PROBLEM,
by M. Donald MacLaren and David W. Walkup.
Jun 64, 36p D1-82-0355, Boeing-Math-353

Unclassified report

Also available from the author.

Descriptors: (*Gu ided missile targets, Optimization), (*Kill probabilities, Guided missile targets), Sequences, Matrix algebra, Military strategy, Damage, Monte Carlo method, Multiple operation, Effectiveness, Launching, Programming (Computers).

The following missile assignment problem is considered. Missiles are to be assigned to targets in two distinct steps. First, each missile is programmed so that it can be fired at any one of a small number of targets, the number of targets being the missile capability. The programming of the missiles is represented by a qualification matrix Q. Second, if battle occurs, all missiles are to be assigned to targets and launched. Each missile must be assigned to a target for which it is programmed. It is assumed that only a random subset X of the missiles will actually be available for battle, and so the assignment must be made for a reduced qualification matrix Q(X). The questions considered are 'what is an optimal assignment given the reduced qualification matrix Q(X).,' and 'what can be expected from this assignment.' Use of a damage function is proposed. An optimal assignment is one which maximizes the value of the damage function. The damage function may be chosen to represent a wide variety of optimization requirements. The main part of the paper describes Monte Carlo procedures for estimating the expected damage and the probability that the damage will be at least c for any number c. (Author)

AD-603 714 Div. 12, 30
OTS Prices: HC $3.00/MF $0.75

Mitre Corp., Bedford, Mass.
A RE-ENTRY VEHICLE SIMULATION DESIGNED FOR THE STUDY OF GROUND SYSTEM REQUIREMENTS,
by P. J. Plender. Jul 64, 88p TM-03973
Contract AF19 628 2390, Proj. 611 1
ESD TDR64 135

Unclassified report

Descriptors: (*Atmosphere entry, Simulation), (*Reentry vehicles, Simulation), (*Ground support equipment, *Reentry vehicles), Aerospace craft, Trajectories, Mathematical models, Digital computers, Analog computers, Tracking.

A computer simulation of re-entry vehicle trajectories has been developed as an aid in determining the requirements of supporting ground-based electronic systems. This report describes the mathematical model used in the simulation and discusses, with the aid of examples, the usefulness of the output data in the preliminary design of tracking and communication networks. (Author)

AD-603 759 Div. 12, 1
OTS Prices: HC $4.00/MF $1.00

IIT Research Inst., Chicago, Ill.
INVESTIGATION OF LOCATION AND RETRIEVAL CRITERIA FOR RE-ENTRY CREW ESCAPE SYSTEMS.
Rept. for 1 Dec 62-31 Jan 64,
by J. A. Campbell and J. V. Capuzzo. Mar 64, 149p
IITRI-K6033
Contract AF33 657 10103, Proj. 1362, Task 136203
FDL TDR64 51

Unclassified report

Descriptors: (*Re-entry vehicles, Abandonment), (*Space crews, Survival), Jettisonable equipment, Descent trajectories, Landings, Position finding, Rescue beacons, Rescues, Recovery.

The equations of motion for escape capsules having lift-to-drag ratios ranging from 0.2 to 2.0 were solved to determine the ground area attainable for these capsules returning to earth from 300-nautical mile equatorial, polar, 30-degree, and 60-degree circular orbits. The landing capabilities of these capsules with respect to the probability of a successful recovery of the downed crew were then determined. This study indicates than an escape capsule with an L/D ratio of 1.0 represents the simplest escape capsule which would have enough maneuvering capability to reach suitable landing areas. A state-of-the art avionics investigation was made to determine the location of existing tracking and location radars, portable emergency radios, direction-finding equipment, and acoustic and visual aids which would aid in the quick location and retrieval of a downed crew. An escape system concept is presented, emphasizing that the successful conclusion of escape requires the determination of the necessary maneuver to reach a desirable landing area, the physical execution of that maneuver, and the transmission of escape information to recovery forces. (Author)

AD-603 784 Div. 12, 1, 28
OTS Prices: HC $9.15/MF $2.50

North American Aviation, Inc., Downey, Calif.
INVESTIGATION OF AEROSPACE VEHICLE CREW STATION CRITERIA,
by J. A. Moran and P. R. Tiller. 31 Jul 64, 613p
SID-64-997
Contract AF33 615 1297, Proj. 1425, Task 142501

ditioned at 42% RH. It was found that these envelopes could be superposed on the envelopes drawn for 0% RH data by performing a vertical shift, i.e., a shift along the stress axis. Further, we found that the same shift, 0.16 log unit, was required to superpose the envelopes for either propellant.

AD-604 176 Div. 10, 9, 27
OTS Prices: HC $3.00/MF $0.50

Aerospace Technology Div., Washington, D. C.
NEW COMBUSTION PROCESSES.
Comprehensive rept. no. 1, 1958-Jan 64.
17 Aug 64, 52p
ATD P64 49; TT 64-71230

Unclassified report

Rept. on Surveys of Soviet-Bloc Scientific and Technical Literature.

Descriptors: (*Combustion, Reviews), (*Detonations Reviews), Ramjet engines, Hypersonic flow, Supersonic flow, Shock waves, Detonation waves, Shock tubes, Wind tunnels, Fuel injection, Ignition, Ignition lag, Autoignition, Hydrogen, Oxygen, Reaction kinetics, Flames, Bibliographies, USSR.

The purpose of the report is to present material related to unconventional combustion processes which might be used in the development of hypersonic ramjet and supersonic combustion processes. A literature search revealed one article directly related to shock-induced combustion and several articles on a new detonative combustion process. Other sections deal with subjects indirectly related to shock-induced combustion, such as reaction kinetics, ignition delays, and some shock and detonation wave characteristics. A general survey and discussion of studies in the field of detonation research and related subjects is given. High-velocity diffusional combustion is not covered. (Author)

AD-604 208 Div. 10, 15, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONCAVE PROGRAMMING FOR GASOLINE BLENDS,
by A. S. Manne. 23 Apr 53, 44p P-383

Unclassified report

Descriptors: (*Gasoline, Mixtures), (*Linear programming, Economics), (*Economics, Linear programming), Mathematical models, Iterative methods, Functions, Equations.

The paper presents a model of the economics of motor gasoline blending -- a maximizing problem subject to certain restraints.

11. Ground Transportation Equipment

AD-604 027 Div. 11, 27
OTS Prices: HC $3.00/MF $0.75

Donaldson Co., Inc., Minneapolis, Minn.
DUST CONCENTRATION MEASUREMENT ON THE U. S. ARMY OVERLAND TRAIN MARK II.
Final rept.,
by Mark G. Mund and Keith J. Conklin. Apr 64, 77p
Contract DA44 177AMC24T, Proj. 3 6170A,
Task 1D543006D40402
TRECOM TR64 16

Unclassified report

Descriptors: (*Air intake filters, Gas turbines), (*Towing vehicles, Desert tests), (*Gas turbines, Dust), Air intake filters, Cargo vehicles, Life expectancy, Erosion, Degradation, Gas flow, Wear resistance, Models (Simulations), Arizona, Army research, Particle sieze, Army equipment, Towed vehicles, Tractors.

The average concentration and particle size distribution of the dust passing the inlet air cleaner and entering a gas turbine powering the Overland Train was determined using model air cleaners which duplicate the performance of the main engine air cleaners. It was found that the main engine air cleaners reduced the dust concentration from an average ambient concentration of 4.7 mg./cu. ft. to an average passing concentration of 0.73 mg./cu.ft. Because of agglomeration, dust passing the air cleaner is apparently the same size as the dust entering, measured as discrete particles. If the effective particle size were measured the dust passing the air cleaner would be finer than the dust entering. Based on past Overland Train experience of short turbine life caused by dust ingestion, the STRATA-Panel Air Cleaners installed on the Overland Train will significantly extend the life of the gas turbines. (Author)

(Artificial)), Oscillation, Damping, Simulation, Rocket motors, Design, Fuel consumption, Relays, Gyro stabilizers.

The prime objective of the investigation was to analyze compensation techniques and sensor nonlinearities in a mass expulsion attitude control system. Three conventional compensators and combinations of these are analyzed and the results presented and compared for acquisition and limit cycle operation. Based primarily on the criterion of low fuel consumption, the rate gyro compensator is best for acquisition while the pseudo-rate compensator is best for limit cycle. The effects of sensor nonlinearities are analyzed for rate and displacement gyros. The rate gyro deadzone produces the only significant effect on the system. This deadzone considerably increases the fuel consumption in the limit cycle. As an extra objective, a unique compensation technique is derived which greatly decreases fuel consumption during acquisition. (Author)

AD-603 975 Div. 12
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ANALYSIS OF AN AIR-TO-AIR, AIR-TO-SURFACE MISSILE,
Master's thesis,
by Eugene Hymas. 1964, 114p
AFIT GGC/EE/64 12

Unclassified report

Descriptors: (*Control systems, Guided missiles), (*Launching, Guided missiles), (*Guided missiles (Air-to-air), Launching), (*Guided missiles (Air-to-surface), Launching), Functions, Equations, Stabilization, Proportional navigation, Guided missile targets, Digital computers.

The transfer function of an air-launched missile is obtained for a wide range of operating conditions. A linear control system is designed. The use of the missile against both airborne and surface targets is shown to be feasible from the standpoint of control-system requirements. Launch envelopes for the missile with a proportional-navigation guidance system are obtained in the horizontal and vertical planes. The effects of various constraints on the missile are determined. Analysis of representative missile-target characteristics at different altitudes demonstrates that the missile can be effective against both airborne and surface targets. (Author)

AD-603 994 Div. 12, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE CURRENT AND PREDICTED STATUS OF ENGINEERING TECHNIQUES IN RELATION TO HUMAN TRAVEL AT UPPER ALTITUDES,
by R. M. Salter. 1 Nov 51, 11p P-249

Unclassified report

Descriptors: (*Spaceflight, Manned), Manned spacecraft, Orbital trajectories, Upper atmosphere, Interplanetary trajectories, Space propulsion, Thrust, Telemeter systems, Reviews.

Consideration is given to the 'how' and 'when' of manned spaceflight. Topics include: regimes of flight in the aeropause; motivating techniques required engineering limitations.

AD-604 024 Div. 12, 30
OTS Prices: HC $4.00/MF $1.00

Bell Aerosystems Co., Buffalo, N. Y.
AERO-SPACE ENVIRONMENT SIMULATION SYSTEM (ASESS). VOL. II. SIMULATION MODELS FOR AEROSPACE COMMAND AND CONTROL.
Final rept.
Dec 63, 139p
Contract AF19 628 2847
ESD TDR63 659, v. II

Unclassified report

Descriptors: (*Command control systems, Simulation), Reentry vehicles, Satellites (Artificial), Space environmental conditions, Orbital trajectories, Rendezvous trajectories, Transfer trajectories, Tracking, Monitors, Programming (Computers), Digital computers, Models (Simulations), Matrix algebra.

The volume represents the results of various independent analyses in those areas of space dynamics which are associated with the Aerospace Environment Simulation System (ASESS). They are included here, in appendix fashion, with the feeling that they will be of value in completing some of the 'gates' or control openings in the Monitor System presented in Volume I (AD-600 186). Included is an Orbit Determination Scheme, which employs advanced techniques in the area of maximum likelihood, as well as Space Force Effectiveness and Satellite Inspector models which provide mission analysis capability. In addition, an Advanced Energy Management System for Reentry Vehicles is reviewed together with a discussion on orbital rendezvous and docking, both summarizing state-of-the-art analyses in these areas. Finally, a technical discussion is included on the problem of Geocentric Transfer and Rendezvous. It should be noted that no direct linkage exists, either between Volume I and II or between the individual appendices. Each problem outlined, is of sufficient magnitude, however, to warrant consideration in connection with ASESS. (Author)

FDL TDR64 86

Unclassified report

Descriptors: (*Manned spacecraft, Research program administration), (*Space crews, Manned spacecraft), Space stations, Design, Human engineering, Space biology, Re-entry vehicles, Launch vehicles (Aerospace), Aerodynamic configurations, Space maintenance, Space capsules, Space environmental conditions, Life support, Orbital trajectories, Control systems, Rendezvous spacecraft, Acceleration, Deceleration, Trajectories, Pressure suits, Parking orbit trajectories, Transfer trajectories, Sanitary engineering, Simulation, Space surveillance systems.

This report presents an analysis of the crew station design criteria for three types of space vehicles. As defined in this report they are (1) a vertical launch, horizontal landing low orbital vehicle, (250-300 nautical miles) manned by a crew of three and designed for reconnaissance and surveillance; (2) a horizontal launched, horizontal landing, high orbit (19,350 miles) vehicle, manned by a crew of three and capable of supporting five passengers over a 10 day period; (3) a nonrecoverable low orbital (250-300 nautical miles) space station capable of supporting a crew of 21 men for a minimum period of 30 days. Recommendations are made in the design of mission oriented stations and life support stations. Methods of validating the recommendation are given along with the suggestion of typical experiments and facilities that could be used as a major segment of the validating procedure. As a result of this research, study areas wherein further research would be beneficial to the establishment of crew criteria have been identified. (Author)

AD-603 802 Div. 12
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE DESIGN OF CONSTANT-VOLUME MISSILE FUSELAGES HAVING MINIMUM DRAG AT SUPERSONIC SPEEDS,
by Alan H. Green. 11 Jun 48, 36p, P-23

Unclassified report

Prepared in cooperation with Douglas Aircraft Co., Inc., Santa Monica, Calif.

Descriptors: (*Fuselages, Design), (*Guided missile components, Drag), Supersonic flight, Angle of attack, Volume, Optimization.

The factors influencing the design of missile fuselages are discussed in relation to the problem of obtaining an optimum design from the drag standpoint. On the basis of the factors and assumptions given, a method is developed for determining the fineness ratio that results in minimum drag for a constant-volume fuselage flying at a fixed angle of attack and Mach number. Using drag data for the attitude of zero angle of attack at Mach numbers between 1.5 and 5, numerical values of optimum fineness ratio are presented for the case of a practical, axially-symmetric fuselage whose shape consists of a conical nose of fixed proportions attached to a cylindrical afterbody. Procedures are indicated for the extension of the results of the study to specific designs of the subject or other geometrical configurations.

AD-603 952 Div. 12, 1
OTS Prices: HC $6.00/MF $1.25

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN AUTOMATIC FLIGHT CONTROL SYSTEM TO SIMULATE SUB-EARTH GRAVITY ENVIRONMENTS IN THE KC-135 AIRCRAFT.
Master's thesis,
by Robert Williamson Kennedy. Jun 64, 206p
AFIT GGC/EE/64 13

Unclassified report

Descriptors: (*Flight control systems, Automatic), (*Gravity (Artificial), Flight paths) (*Automatic pilots, Design), Mars, Moon, Research planes, Analog computers, Acceleration, Flight speeds, Flight paths, Wind, Servomechanisms, Functions, Equations, Design, Accelerometers.

The purpose of the paper was to design an automatic flight control system capable of simulating zero-, Moon-, or Mars-gravity environments (±0.005g) in the 'zero-g', KC-135. The problem analysis consists of a mathematical investigation of the simulation of gravity environments with maneuvering aircraft. The system is designed by the use of root locus techniques and analog computer simulation. The analog simulation is used to evaluate the system and the system succeeds in simulating the desired gravity environments within the required tolerances for periods greater than 12 seconds per maneuver. (Author)

AD-603 953 Div. 12
OTS Prices: HC $6.00/MF $1.25

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
COMPARISON OF HIGH-GAIN-LINEAR AND SELF-ADAPTIVE FLIGHT CONTROL SYSTEMS WITH NON-LINEARITIES INTRODUCED.
Master's thesis,
by Henry M. Serex and James N. Holt. Jun 64 231p
AFIT GGC/EE/64 11

Unclassified report

Descriptors: (*Flight control systems, Analysis), (*Adaptive control systems, Aerospace craft), (*Automatic pilots, Adaptive control systems), Gain, Simulation, Analog computers, Design, Stability, Dynamics, Feedback, Oscillation, Damping, Functions, Analysis, Linear systems.

The report analyzes the operation of a high-fixed-gain linear flight control system and a self-adaptive system, the MH-96 autopilot. The two systems are simulated on an analog computer for both linear and nonlinear operation. Saturation, backlash, and stiction are introduced, and both systems are found to operate satisfactorily. Using response criteria for high-performance flight vehicles, comparison of the two system designs shows that neither enjoys a clear advantage over the other, but the self-adaptive design is chosen as the preferred system because of its stability under disturbance conditions and its better limit cycle characteristics when backlash is present. (Author)

AD-603 954 Div. 12
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN ANALYSIS OF COMPENSATION TECHNIQUES AND SENSOR NONLINEARITIES IN A MASS EXPULSION SINGLE-AXIS SATELLITE ATTITUDE CONTROL SYSTEM.
Master's thesis,
by Richard G. Cronquist and David W. Welp. Jun 64, 124p
AFIT GGC/EE/64 6

Unclassified report

Descriptors: (*Satellites (Artificial), Attitude control systems), (*Attitude control systems, Satellites

by M. J. Barrett and R. L. MacNeil. Jun 64, 66p
TO-B-64-1
Contract OCD OS62 14, Task 1111A

Unclassified report

Descriptors: (*Shielding, Effectiveness), (*Gamma rays, Radiation measurement systems), Steel, Structures, Buildings, Roofs, Shelters, Attenuation, Collimators, Dosimeters, Radiological contamination, Radioactive fallout, Models (Simulations), Mathematical analysis, Monte Carlo method, Nuclear scattering, Distribution.

Measurements are reported of the gamma radiation-induced dose in a compartmented steel structure. The experimental dose profile is compared with predictions based on computational techniques in the Office of Civil Defense Engineering Guide, as well as with computations performed by the Monte Carlo technique. Although agreement (within experimental accuracy) is reached between the Monte Carlo and the experimental measurements, the OCD predictions appear to overestimate the dose because of an incomplete consideration of the effect of spacing of the structure slabs. The degree of conservatism does not appear to be serious, however. (Author)

13. Installations and Construction

AD-603 539 Div. 13, 14
OTS Prices: HC $3.00/MF $0.50

IIT Research Inst., Chicago, Ill.
RESPONSE OF FOAM-ISOLATED TUNNEL LININGS TO TRANSIENT LOADINGS.
Final rept. for 15 May 63-15 Jan 64,
by E. M. Naureckas and W. F. Riley. Jun 64, 57p
Contract AF29 601 6022, Proj. 1080,
Tasks 108010, 13 158
WL TDR64-28

Unclassified report

Descriptors: (*Foams, Vibration isolators), (*Vibration isolators, Underground structures), (*Expanded plastics, Vibration isolators), Materials, Styrene plastics, Isocyanate plastics, Mechanical properties, Model tests, Shock waves, Stresses, Time, Functions, Protective coverings, Nuclear explosion damage.

This research program was conducted to determine the behavior of a foam-isolated tunnel liner in an elastic material during passage of a plane stress wave. The specific objectives of the program included a determination of time-dependent stress fields in the elastic material, time-dependent magnitudes and location of crushing in the isolation material, and time-dependent stresses and motions of the tunnel liner. The results of the program indicate that the stresses in the liner are significantly reduced by the crushing of the foam. The rigid body motions of the liner, however, are not significantly influenced by the presence of the foam. (Author)

AD-603 626 Div. 13, 17
OTS Prices: HC $0.50/MF $0.50

Army Materials Research Agency, Watertown, Mass.
BUCKLING CHARACTERISTICS OF CORRUGATED CYLINDERS - EFFECT OF USING A HIGH STRENGTH MATERIAL.
Technical rept.,
by Burton S. Parker. May 64, 23p
Proj. 1A010501B010
AMRA TR6414

Unclassified report

Descriptors: (*Buckling (Mechanics), Cylindrical bodies), (*Cylindrical bodies, Buckling (Mechanics)), (*Structural shells, Cylindrical bodies), Mechanical properties, Aluminum alloys, Stiffened cylinders, Compressive properties, Tensile properties, Moment of inertia, Elasticity.

Results of a supplement to an investigation to study the buckling characteristics of corrugated cylinders are given. The present study evaluates the effect of using a high strength material. Twenty-five models of varying height, fabricated from 7075-T6 aluminum, were tested under axial compressive loads for instability. As in the earlier work, the buckling of corrugated cylinders is treated from the viewpoint of the buckling of individual corrugation elements. For slenderness ratios of these elements greater than 110, the buckling data correlate satisfactorily with the Euler column theory. For slenderness ratios below 82, the critical stress is much lower than that predicted by any of the column theories and is approximated closest by the elastic plate buckling criterion which serves as an upper limit.

AD-603 676 Div. 13, 25
OTS Prices: HC $2.00/MF $0.50

Fritz Engineering Lab., Lehigh Univ., Bethlehem, Pa.
THE ULTIMATE STRENGTH OF SINGLE-STORY FRAMES,
by Joseph A. Yura and Theodore V. Galambos.
Jul 64, 44p Fritz-273.18
Contract NObs 90041

Unclassified report

Report on Welded Continuous Frames and Their Components.

Descriptors: (*Structures, Loading (Mechanics)), (*Loading (Mechanics), Deflection), (*Beams (Structural), Buckling (Mechanics)), Tensile properties, Stresses, Moments, Plasticity, Slender bodies, Structural properties, Welds.

The ultimate strength of single-story, pinned-base rigid frames subjected to vertical and horizontal loads is solved. Interaction curves between the axial load and the horizontal load are developed for a column L/r = 40. Inelastic behavior and residual stresses are considered. Equilibrium of the deflected structure is considered so that the P - delta effect (the additional moments caused by the deflection delta at the column tops and the axial load in the columns) is investigated. The structural behavior of the structure is discussed. The results of the analysis are compared with the 1961 and 1963 AISC Specifications, and a simple plastic analysis performed on the deflected structure. The effect of variation of column slenderness ratios is also discussed. (Author)

AD-603 691 Div. 13
OTS Prices: HC $2.00/MF $0.50

Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
DYNAMIC BUCKLING OF IMPERFECTION-SENSITIVE STRUCTURES.
Technical rept. no. 18,
by Bernard Budiansky and John W. Hutchinson.
Jun 64, 46p
Contract Nonr1866 02

Unclassified report

Descriptors: (*Stiffened cylinders, Buckling (Mechanics)), (*Buckling (Mechanics), Structures), Loading (Mechanics), Shear stresses, Deflection, Elasticity, Equations, Differential equations.

Consideration is restricted to elastic buckling under suddenly applied dead loads maintained at a constant magnitude. Following a discussion of criteria for dynamic buckling, the implications of some simple imperfection-sensitive models are discussed. Next, on the basis of Koiter's theory of post-buckling behavior general approximate theories of dynamic buckling are formulated and their relations to the simple models are studied. Finally, as particular examples, analyses are made of the dynamic buckling under suddenly applied axial loads of circular cylindrical shells, stiffened by longitudinal stringers, as well as unstiffened.

AD-604 192 Div. 13, 20
OTS Prices: HC $3.00/MF $0.75

Technical Operations, Inc., Burlington, Mass.
DOSE RATE DISTRIBUTION IN A COMPARTMENTED STRUCTURE.

Heat treatment, Tantalum alloys, Stresses, Oxidation, Niobium, Titanium alloys, Silicon, Aluminum, Diffusion, Metal powders, Transition temperature, High temperature research.

The objective of this program is the development of oxidation protective coatings for vanadium-base alloys for use at 1800F to 2500F. The effect of pack-siliconizing on the mechanical properties of 0.020 in. thick sheet of V-60 w/o Cb--1 w/o Ti is being studied. Preliminary results indicate that the siliconizing process has no effect on strength, but causes some reduction in tensile ductility. The transition temperature of the coated alloy is below +32F; its lower limit is currently being determined. The development of an oxidation resistant slurry or liquid cementation type of coating for V-60 w/o Cb - 1 w/o Ti is progressing. Slurry compositions containing tin, silicon, silver, copper, aluminum, and columbium have been investigated; several of these show good coverage, even at corners and edges. The static oxidation life of other promising vanadium-base alloys, coated by the pack-siliconizing process is also being investigated. (Author)

AD-603 899 Div. 14
OTS Prices: HC $4.00/MF $0.75

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
STUDIES ON THE FORMATION AND PROPERTIES OF HIGH-TEMPERATURE DIELECTRICS.
Final rept.,
by A. von Hippel. Jul 64, 111p LIR-TR-191
Contract AF33 616 8353, Proj. 7371, Task 737101
ML TDR64 219

Unclassified report

A portion of the original document contains fine details which may make reading of photocopy difficult.

Descriptors: (*Dielectrics, Physical properties), (*Heat-resistant materials, Dielectrics), Oxides, Crystal growth, Films, Mass spectroscopy, Instrumentation, Ferroelectric materials, Titanium compounds, Carbides, Nitrides, Electrical conductance, Rutile, Crystal structure, Chemical analysis, Synthesis (Chemistry), Mossbauer effect, Cadmium compounds, Sulfides, Barium compounds, Titanates, Alkali metal compounds, Halides, Yttrium compounds, Borates, Bismuth compounds, Ruby, Garnet.

The report summarizes the outcome of a three year's project concerned with fundamental research, preparation methods, measurement techniques, and quantitative data on high-temperature dielectrics. After theoretical discussion of basic problems, the survey presents a sequence: methods of growing high-temperature oxide crystals; film studies in ultrahigh vacua; development of a quadrupole mass spectrograph; dielectric instrumentation and measurements from low frequencies to millimeter waves and from low temperatures to beyond 1400C; research on ferroelectrics and on the band structure of TiC, TiN, and TiO; conduction phenomena in rutile; field gradient measurements on dielectrics; structure analysis of new high-temperature materials; chemical analysis and synthesis procedures; Mossbauer effect and breakdown strength investigations. (Author)

AD-604 009 Div. 14, 17
OTS Prices: HC $3.00/MF $0.75

Lincoln Lab., Mass. Inst. of Tech., Lexington.
EXPLORATORY PREPARATION OF FOILS STRONGLY COLORED IN THE 1 - 6 MICRON REGION OF THE INFRARED.
Group rept.,
by E. W. Pike. 30 Jul 64, 87p LL-1964-36
Contract AF19 628 500
ESD TDR64 357

Unclassified report

Descriptors: (*Foils, Reflectors), (*Infrared radiation, Reflection), (*Reflectors, Foils), Films, Metal films, Copper, Silver, Gold, Nickel, Vapor plating, Organic materials, Titanium compounds, Sulfides, Plastics, Manufacturing methods, Costs, Tin compounds, Oxides, Ceramic materials, Electrical properties, Optical properties, Material forming, Colors, Spectra (Infrared).

A search was made for a material approximating the following combination of qualities: A strongly colored reflectivity, specular or diffuse, in the near IR conforming closely to the schedule: > 5 micron 1.0 reflectivity; 4 micron, 0.9; 3 micron, 0.8; 2.5 micron, 0.7; 2 micron, 0.45; 1.5 micron, 0.3; 1 micron, 0.2; <0.8 micron, <0.1. Minimum absorption at all wavelengths. Minimum weight per unit area of reflecting surface, in the order of 1 gm/sq meter (5000 sq. ft. /lb); this is the weight of a plastic foil about 1 micron thick. Easy dispersal, from storage in a compact form, into separated airborne flakes or bubbles, large enough (>30 micron diameter) that diffraction effects will not distort the color, yet small enough to resist deformation by ordinary air turbulence. Cost, in the storage form, not exceeding $. 02/sq ft.

AD-604 010 Div. 14, 4
OTS Prices: HC $1.00/MF $0.50

Frick Chemical Lab., Princeton Univ., N. J.
HIGH TEMPERATURE POLYMERS: H-FILM AND SP-POLYMER.
Technical rept.,
by A. D. Mair, M. C. Shen and A. V. Tobolsky.
Aug 64, 13p RLT83
Contract Nonr1853 07, Proj. NR356 377

Unclassified report

Descriptors: (*Heat-resistant plastics, Viscoelasticity), (*Polyamide plastics, Viscoelasticity), Polymers, Films, Thermal properties, Transition temperature, Melting, Stability, Molecular structure.

A study was made of a new family of polyimide polymers (H-Film and SP-Polymer) which have reasona ble thermal stability up to 400C in air. It was found that they show no glass transition temperature and no melting point over the entire temperature range to 500C. The viscoelastic properties reported here are different from those of any polymers studied up to now. Since their molecular structure is reasonably well known, there is reason to believe that other polymers of the 'stiff chain' type will show similar viscoelastic properties. The lack of aliphatic hydrogen makes these polymers peculiarly resistant to oxidation. This feature can also be duplicated in similar families of polymers. These polymers indicate that very great thermal stability and relatively temperature insensitive viscoelastic properties can be achieved by organic polymers. (Author)

AD-604 016 Div. 14, 20
OTS Prices: HC $3.00/MF $0.50

General Dynamics/Fort Worth, Tex.
STUDY OF THE EFFECTS OF NUCLEAR RADIATION ON THE MECHANICAL PROPERTIES OF ACETAL RESINS DELRIN AND CELCON,
by E. G. Fritz. 31 Mar 64, 54p NARF-63-18T,

14. Materials (Non-Metallic)

AD-603 564 Div. 14, 26, 31
OTS Prices: HC $2.00/MF $0.50

Narmco Research and Development Div., Whittaker Corp., San Diego, Calif.
INTERLAMINAR SHEAR OF FILAMENT-WOUND REINFORCED PLASTICS.
Annual summary rept. no. 1, 28 Jun 63-30 Jun 64, by Robert A. Elkin. 30 Jul 64, 49p
Contract N60921 7094

Unclassified report

Descriptors: (*Laminated plastics, Filament-wound construction), (*Winding, Filament-wound construction), (*Filament-wound construction, Laminated plastics), Reinforcing materials, Epoxy plastics, Amino plastics, Phenolic plastics, Glass textiles, Fibers (Synthetic), Shear stresses, Fatigue (Mechanics), Polyester plastics, Compressive properties, Elasticity, Viscoelasticity, Composite materials, Loading (Mechanics), Plastics, Submarine hulls.

One of the newer epoxy resins (ERLA 0400) used in the screening studies exhibited interlaminar shear strenghts in excess of 15,000 psi. By winding fibers in the third planar direction, the apparent interlaminar shear strength of the NOL ring type specimens was increased by approximately 30%. Although the test data were not completely conclusive, results indicated that the triplanar winding increases both the ultimate compression strength and fatigue resistance of circumferentially wound cylinders. (Author)

AD-603 690 Div. 14, 20
OTS Prices: HC $2.00/MF $0.50

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST COORDINATE INDEX, PART II FOR ACCESSION LISTS FROM OCTOBER 1, 1963, TO JULY 31, 1964.
10 Aug 64, 28p

Unclassified report

A portion of the original document contains fine details which may make reading of photocopy difficult.

Descriptors: (*Indexes, Radiation damage), (*Radiation damage, Materials), Subject indexing, Radiation chemistry, Space environmental conditions, Dosimeters, Nuclear particles, Electronics.

The index is subdivided into four sections. The first, Radiation Environment, includes dosimetry and energy aspects of all electromagnetic and particulate radiation sources, with the exception of space radiation. Section two deals with materials, properties, secondary environment (including space environments), devices, and all other subject concepts. An author section and a generating organization section is added to this quarterly index, as sections three and four.

AD-603 702 Div. 14
OTS Prices: HC $5.00/MF $1.00

Fluid Power Controls Lab., Oklahoma State Univ., Stillwater.
DECONTAMINATION OF HYDRAULIC FLUIDS.
Annual technical rept. for 27 Dec 62-27 Dec 63, Jun 64, 174p
Contract AF33 657 9958, Proj. 912A, Task 97092
RTD TDR63 4262

Unclassified report

Descriptors: (*Hydraulic fluids, Decontamination), (*Centrifuges, Design), Impurities, Separation, Test equipment, Models (Simulations).

The report includes a description of the design, development, and application of miniature hydroclone prototypes for decontaminating hydraulic fluid in ground support equipment. The hydroclone is defined, described and explained in a manner appropriate for an introductory treatise. The specialized equipment acquired or constructed for implementation of the Hydroclone Project is delineated, as are its applications to the hydroclone study. The comprehensive investigation to determine the parameters for an optimum hydroclone for MIL-F-5606 hydraulic fluid is related, and the final values of these parameters which comprise the prototype hydroclone for MIL-F-5606 are given. A unique method for endurance testing of materials for hydroclone fabrication is portrayed, and the findings of these tests are reported herein. (Author)

AD-603 748 Div. 14, 4, 31
OTS Prices: HC $3.00/MF $0.50

Union Carbide Plastics Co., Bound Brook, N. J.
RESEARCH ON IMPROVED EPOXY RESINS.
Quarterly progress rept. no. 5, 1 May-1 Aug 64, by J. R. Harvey, W. P. Mulvaney, R. F. Sellers, and S. G. Smith, Jr. 1 Aug 64, 54p
Contract Nonr4172 00X

Unclassified report

Descriptors: (*Laminated plastics, Filament wound construction), (*Filament wound construction, Laminated plastics), (*Epoxy plastics, Physical properties), (*Epoxides, Molecular structure), Cyclopentanes, Ethers, Cyclopentenes, Phenols, Purification, Tensile properties, Compressive properties, Shear stresses, Catalysts, Binders, Submarine hulls, Composite materials, Plastics.

A discussion of the relationship of physical properties to molecular configuration and to the relative purity of representative sample resins is presented as interpreted from cast resin data and NOL Rings. A major breakthrough in compressive properties was found in EP-2114 which showed modulus greater than 1,000,000 psi and yield greater than 50,000 psi. Significant improvement in interlaminar shear strength data for ERRA-0300 and ERLA-0400 was achieved through NOL Ring fabrication technique. Progress is described on the continued evaluation of new and previously prepared epoxy molecular configurations. (Author)

AD-603 774 Div. 14, 17
OTS Prices: HC $1.00/MF $0.50

IIT Research Inst., Chicago, Ill.
HIGH-TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS.
Bimonthly progress rept. no. 4, 1 Apr-31 May 64, by Larry I. Kane and John J. Rausch. 1 Jul 64, 21p
IITRI-B6019-4
Contract NOw64 0140c

Unclassified report

Descriptors: (*Coatings, Vanadium alloys), (*Vanadium alloys, Refractory coatings), (*Niobium alloys, Refractory coatings), (*Silicon coatings, Vanadium alloys), Silicides, Tensile properties, Mixtures, Sheets, Ductility, Oxides, Films, Silver, Tin, Copper, Protective treatments,

15. Mathematics

AD-603 538 Div. 15
OTS Prices: HC $2.00/MF $0.50

Operations Research Center, Univ. of California, Berkeley.
BOUNDS ON DENSITIES AND HAZARD RATES,
by R. E. Barlow and A. W. Marshall.
Apr 64, 29p ORC-64-9(RR)
Contract Nonr222 83

Unclassified report

This document is also being issued as Mathematical Note no. 341 (DI-82-0338), Boeing Scientific Research Labs., Seattle, Wash.

Descriptors: (*Hazards, Probability), (*Probability, Hazards), (*Statistical functions), (*Statistical distributions), (*Inequalities), Reliability, Distribution theory, Mathematical prediction, Density, Functions.

Sharp upper and lower bounds are derived for hazard rates and densities of distributions with monotone harzard rate. These bounds are related to Chebyshev inequalities in that they are obtained under the condition that certain moments are known. Similar bounds are also obtained when the density is a Polya frequency function of order two. (Author)

AD-603 563 Div. 15, 16
OTS Prices: HC $3.00/MF $0.50

Booz-Allen Applied Research, Inc., Bethesda, Md.
ON INCREASING TREATMENT CONTRAST PRECISION AND THE ESTIMATION OF STRUCTURAL PARAMETERS IN COVARIANCE ANALYSIS,
by William S. Mallios, Jun 64, 53p
Contract DA18 064AMC103A

Unclassified report

Descriptors: (*Biology, Combinatorial analysis), (*Analysis of variance, Combinatorial analysis), (*Combinatorial analysis, Analysis of variance), Mathematical models, Errors, Statistical analysis, Statistical tests, Least squares method.

Analysis of covariance in randomized and balanced incomplete block designs is reconsidered in terms of structural regression. In practice, the covariable is usually uncontrolled and may follow a linear model as does the variable of interest. If the covariable and treatments are independent, then the covariable model contains no treatment effect, and the treatment contrast precision on the variable of interest is increased, not only asymptotically, but in the finite sample. If the covariable is affected by one more of the treatments, then the estimation of direct and indirect effects is considered. Finally, when structural parameters are underidentified, in which case direct and indirect effects are not estimable, an alternative estimation procedure is discussed. (Author)

AD-603 582 Div. 15
OTS Prices: HC $1.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
MOMENT CROSSINGS AS RELATED TO DENSITY CROSSINGS,
by George Marsaglia, Albert W. Marshall, and Frank Proschan. Jul 64, 7p D1-82-0358, Boeing-Math-354

Unclassified report

Also available from the author.

Descriptors: (*Statistical functions, Distribution theory), (*Distribution theory, Statistical functions), Statistical distributions, Integral transforms, Inequalities, Analysis of variance, Measure theory.

In this paper it is shown how the number of moment crossings of two symmetrical densities is related to the number of crossings of the densities. This generalizes a result of Fisher's recently proved by Finucan (1964) (A note on Kurtosis). (Author)

AD-603 667 Div. 15, 30
OTS Prices: HC $3.00/MF $1.00

Martin-Marietta Corp., Denver, Colo.
PRODUCTS AND QUOTIENTS OF RANDOM VARIABLES AND THEIR APPLICATIONS,
Rept. for Sep 63-Mar 64,
by James D. Donahue. Jul 64, 180p
Contract AF33 615 1023, Proj. 7071, Task 707101
ARL 64 115

Unclassified report

Descriptors: (*Statistical analysis, Engineering), (*Statistical distributions, Distribution theory), (*Distribution theory, Bibliographies), Statistical functions, Statistical processes, Mathematical models, Tables, Guns, Cyclic rate, Booster motors, Selection, Life support, Closed ecological systems, Differential equations, Radiation measurement systems, Management planning.

In this report, the general techniques for determining the distributions of products and quotients of random variables are discussed. Some exact and asymptotic results pertaining to the distributions of the products and quotients of certain random variables which generally occur as measurement error are also presented together with their applications. An extensive bibliography is included at the end of the report. (Author)

AD-603 687 Div. 15
OTS Prices: HC $2.00/MF $0.50

Coordinated Science Lab., Univ. of Illinois, Urbana.
ON CERTAIN RELAXATION OSCILLATIONS: ASYMPTOTIC SOLUTIONS,
by Peter James Ponzo and Nelson Wax.
Jul 64, 49p CSL-R-229
Contract DA28 043AMC00073E

Unclassified report

Descriptors: (*Harmonic analysis, Nonlinear differential equations), (*Nonlinear differential equations, Harmonic analysis), (*Differential geometry, Relaxation oscillators), Numerical analysis, Series, Functions, Taylor's series, Differential equations.

Periodic solutions of the generalized Liénard equation are investigated in the phase and Liénard planes. Certain comparison equations are obtained by modifying the functions f(x), g(x), F(x) = integral evaluated from 0 to x f(u)du, so that the resulting equations may be integrated to within an error of order mu to the - 2.

AD-603 688 Div. 15
OTS Prices: HC $2.00/MF $0.50

Coordinated Science Lab., Univ. of Illinois, Urbana.
ON CERTAIN RELAXATION OSCILLATIONS: CONFINING REGIONS,
by Peter James Ponzo and Nelson Wax.
Jul 64, 45p CSL-R-228
Contract DA28 043AMC00073E

Unclassified report

FZK-9-194
Contract AF33 657 7201
Unclassified report

Descriptors: (*Acetal plastics, Radiation damage), (*Radiation damage, Acetyl plastics), Hardness, Tensile properties, Statistical analysis, Nuclear particles, Copolymerization.

Two commercial acetal resins (Delrin and Celcon) were exposed to reactor radiation at room temperature in air to five levels of absorbed dose. The tensile strength of both resins was found to decrease rapidly with increasing dose: 50% of the original value is reached at about 0.3 gigaergs/gm(C) for Delrin and at about 0.75 gigaergs/gm(C) for Celcon. At about 1 gigaerg/gm(C), both materials had virtually lost their mechanical usefulness. The Shore-D hardness of the two resins was found to decrease exponentially with dose. On the basis of weight-loss measurements, the G-values for formaldehyde formation were conservatively estimated to be 15.4 and 8.9 for Delrin and Celcon, respectively. Depolymerization appears to be the predominant mode of degradation. (Author)

AD-604 023 Div. 14
OTS Prices: HC $3.00/MF $0.50

Southern Research Inst., Birmingham, Ala.
THE DEVELOPMENT AND EVALUATION OF HEAT-RESISTANT, RAIN-EROSION-RESISTANT COATINGS.
Final summary rept. for 26 Jun 63-26 Jun 64,
by R. B. Perkins. 31 Jul 64, 52p SRIB-6890-1533-VI
Contract N156 43450, Task RRMA02 019 200 1R007 06 01
Unclassified report

Descriptors: (*Heat-resistant materials, Paints), (*Plastic coatings, Halocarbon plastics), (*Halocarbon plastics, Plastic coatings), Heat-resistant plastics, Wear resistance, Erosion, Rainfall, Thermal properties, Tests, Paint primers, Pigments, Solvents, Additives, Silicone plastics, Polyamide plastics, Synthesis (Chemistry).

A coating based on Viton A, a fluorocarbon polymer, was developed that provides good resistance to rain erosion (abrasion), as determined by the Jet Abrader Method, after exposure to high temperatures or to weathering. The abrasion resistance of Viton A coating was decreased only slightly by exposure at 500F for 15 hours or by exposure for 300 hours in an Atlas Twin-Arc Weather-Ometer. A number of silicon-nitrogen polymers were synthesized and evaluated, and, although some of these polymers had outstanding resistance to high temperatures, none of the coatings prepared with these polymers had sufficient abrasion resistance to be useful for the purpose of the project. (Author)

AD-604 104 Div. 14, 9, 30
OTS Prices: HC $2.00/MF $0.50

Aerojet-General Corp., Sacramento, Calif.
HYDROSTATIC TEST PROCEDURES.
Final rept.
31 Jul 64, 40p AGC-0627-II-F
Contract NOw63 0627c, Task 2
Unclassified report

Descriptors: (*Hydrostatic pressure, Test methods) (*Filament wound construction, Pressure vessels), (*Glass, Filament wound construction), High-pressure research, Reinforcing materials, Spheres, Compressive properties, Rupture, Tests.

The objectives of the investigation were to determine experimentally (1) the effect that the pressurization rate has on the first-cycle burst pressure of filament-wound vessels, and (2) the effect that prepressurization to different levels of proof pressure and humidity exposure have on the second-cycle burst pressure of such vessels if pressurized at a high rate.

AD-604 278 Div. 14, 27
OTS Prices: HC $10.45/MF $3.00

Air Force Materials Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
PROCEEDINGS OF THE USAF AEROSPACE FLUIDS AND LUBRICANTS CONFERENCE,
ed. by R. L. Adamczak. Jun 64, 743p
Proj. 3044, Task 304402
ML TDR64 127
Unclassified report

Conference held Apr. 16, 17, 18, and 19, 1963, San Antonio, Texas. A portion of the originial document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Lubricants, Symposia), Space flight, Lubrication, Gas turbines, Films, Greases, Liquid metals, Bearings, Gas bearings, Fatigue (Mechanics), Heat transfer, Hydraulic fluids, Test facilities, Specifications, Azines, Friction, Boron compounds, Nitrides, Ethers, Coolants, Rubidium, Cesium, Superconductors.

The purpose of the conference was to present unclassified results of Air Force internal and contractual research and development programs in the broad field of aerospace fluids and lubricants, as well as selected applicable topics from other government agencies and industry. Sessions included gas turbine lubricants, solid-film lubricants, aerospace lubricants, greases and advanced base stocks; liquid metal lubrication, gas bearings, aerospace bearings, and bearing fatigue; liquid metals, heat transfer and hydraulic fluids. Fifty-eight technical papers are presented. These papers range in scope from broad flight lubrication requirements to where fluid samples should be sent for evaluation, and from operational problems of MIL-L-7808 to the synthesis of triphenyltriazine and to fractional frequency whirl of gas bearings. The proceedings attempt to provide the current state-of-the-art work in the above areas since the last conference in November 1960. The papers point out that although advanced fluid and lubricant materials have progressed considerably, there is still a substantial gap between requirements and available products. As a result lubrication techniques as gas bearings, liquid metal bearings and magnetic bearings are taking on increased importance and endeavors. (Author)

Final technical rept. for 1 Jun 63-30 May 64,
by A. Ostrowski. 30 May 64, 21p
Contract DA91 591EUC2824

Unclassified report

Descriptors: (*Numerical analysis, Polynomials), (*Iterative methods, Functions), (*Polynomials, Numerical analysis), Algebra, Series, Numbers, Sequences, Theorems, Matrix algebra, Equations, Switzerland.

Contents:
Runge's rule of signs
A complement to the discussion of approximations by algebraic equations
Generalizations of Laguerre's approximation method
Result on Diophantine approximations
On Ermakof's convergence and divergence criteria

AD-603 798 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONCERNING COMPOUND RANDOMIZATION IN THE BINARY SYSTEM,
by John E. Walsh. Rev. 21 Jun 49, 12p P-10

Unclassified report

Descriptors: (*Set theory, Numbers), (*Number theory, Binary arithmetic), (*Binary arithmetic, Number theory), Sequences, Probability, Theorems.

Considered is a set of approximately random binary digits obtained by some experimental process. This paper outlines a method of compounding the digits of this set to obtain a smaller set of binary digits which is much more nearly random. The method presented has the property that the number of digits in the compounded set is a reasonably large fraction (say of the magnitude 1/3 or 1/4) of the original number of digits. If a set of very nearly random decimal digits is required, this can be obtained by first finding a set of very nearly random binary digits and then converting these digits to decimal digits. The concept of maximum bias is introduced to measure the degree of randomness of a set of digits. A small maximum bias shows that the set is very nearly random. The question of when a table of approximately random digits can be considered suitable for use as a random digit table is investigated. It is found that a table will be satisfactory for the usual types of situations to which a random digit table is applied if the reciprocal of the number of digits in the table is noticeably greater than the maximum bias of the table. (Author)

AD-603 799 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
BRANCHING PROCESSES,
by T. E. Harris. Rev. 29 Jul 48, 37p P-14

Unclassified report

Prepared in cooperation with Douglas Aircraft Co., Inc., Santa Monica, Calif.

Descriptors: (*Stochastic processes, Mathematical models), (*Mathematical models, Stochastic processes), Probability, Statistical functions, Statistical distributions, Series, Genetics, Population.

This paper is concerned with a simple mathematical model for a branching stochastic process. Using the language of family trees we may illustrate the process as follows. The probability that a man has exactly r sons is P sub r, r = 0,1,2,... Each of his sons (who together make up the first generation) has the same probabilities of having a given number of sons of his own; the second generation have again the same probabilities, and so on. Let Z sub n be the number of individuals in the nth generation. The probability distribution of Z sub n is studied.

AD-603 800 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME BOUNDED SIGNIFICANCE LEVEL PROPERTIES OF THE EQUAL-TAIL SIGN TEST,
by John E. Walsh. Rev. 3 Jan 51, 14p P-13

Unclassified report

Descriptors: (*Statistical tests, Population (Mathematics)), (*Population (Mathematics), Statistical tests), Measure theory, Probability, Statistical analysis.

The purpose of this paper was to investigate under what generalized conditions the equal-tail sign test for the median is a satisfactory approximation to the corresponding generalized test in the sense that the significance levels are nearly the same. It was found that the significance levels of the two tests are approximately equal for a wide variety of situations if the number of observations is not large. This, from the viewpoint of significance level, the equal-tail sign test for the median is an idealization which represents a sufficiently accurate approximation to the test of interest for many practical cases. This significance level stability, combined with its other favorable properties, suggests that the equal-tail sign test be seriously considered for application whenever the population median is to be tested on the basis of a small number of observations. Corresponding confidence interval properties are also derived.

AD-603 803 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NOTE ON THE NUMERICAL PROBLEM OF MATRIX INVERSION,
by W. B. White. 19 Jul 48, 4p P-31

Unclassified report

Descriptors: (*Matrix algebra, Numerical methods and procedures), (*Numerical methods and procedures, Matrix algebra), Determinants, Simultaneous equations, Equations.

The present method for obtaining the inverse of a matrix is essentially an extension of Crout's method for solving a system of simultaneous linear equations and involves three basic operations.

AD-603 804 Div. 15
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
BAYES AND MINIMAX SOLUTIONS OF SEQUENTIAL DECISION PROBLEMS,
by K. J. Arrow, D. Blackwell, and M. A. Girshick.
30 Aug 48, 60p P-37

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Sequential analysis, Decision theory), (*Decision theory, Sequential analysis), Probability, Costs, Statistical functions, Optimization, Convex sets, Sampling, Game theory.

Descriptors: (*Harmonic analysis, Nonlinear differential equations), (*Nonlinear differential equations, Harmonic analysis), (*Differential geometry, Relaxation oscillators), Numerical analysis, Series, Functions, Taylor's series, Differential equations.

Relaxation oscillations described by the generalized Lienard equation are investigated in the phase and Lienard planes. When f(x), g(x), and F(x) = integral evaluated from 0 to x f(u)du are subject to certain restrictions, a number of analytic curves can be obtained in these planes which serve as bounds on solution trajectories. Piece-wise connection of such bounding curves provide explicit annular regions with the property that solution trajectories on the boundary of an annulus move to the interior with increasing time, t. The Poincare-Bendixson theorem then guarantees at least one periodic orbit within such an annulus. It is shown that the periodic orbits which are isolated by this means are unique within the annulus, hence orbitally stable.

AD-603 722 Div. 15, 1, 12, 30
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
VARIATIONAL PROBLEMS WITH STATE VARIABLE INEQUALITY CONSTRAINTS,
by Stuart Dreyfus. Jul 62, 99p P-2605

Unclassified report

Descriptors: (*Calculus of variations, Dynamic programming), (*Dynamic programming, Calculus of variations), (*Guided missile trajectories, Optimization), (*Trajectories, Aircraft), Decision theory, Inequalities, Control, Theory, Equations, Motion, Numerical analysis, Differential equations, Mathematical programming, Operations research.

Contents:
The problem of Lagrange
The problem of Mayer
Decision variable inequality constraints
State variable inequality constraints
Numerical solution: Successive approximation to the problem
Successive approximation to the solution
The numerical solution of an unconstrained problem
The bounded brachistochrone problem
The Hamilton-Jacobi equation
Terminal conditions for multipliers.

AD-603 734 Div. 15
OTS Prices: HC $2.00/MF $0.50

University Coll., Cork (Ireland).
LINEAR BOUNDARY-VALUE PROBLEMS, III: THE LAMBDA-METHOD FOR POLYGONAL PLATES.
Scientific rept. no. 1,
by Patrick M. Quinlan. Apr 64, 47p
Grant AF EOAR62 43
AFOSR 64 1294

Unclassified report

Descriptors: (*Boundary value problems, Sheets), Geometric forms, Panels (Structural), Loading (Mechanics), Deformation, Integrals, Green's function, Simultaneous equations, Mathematical analysis.

Edge-functions and the lambda-method for providing a particular integral or Greene's function are combined to formulate the necessary simultaneous equations governing the bending of a polygonal plate, with or without polygonal holes, under a wide range of loadings and boundary conditions. A particular feature is the development of the computer-formula approach, under which all cases are combined in a single formula complete with the necessary computer indicators.

AD-603 739 Div. 15, 30
OTS Prices: HC $4.00/MF $1.00

Electronics Research Lab., Univ. of California, Berkeley.
THE PROBLEM OF IDENTIFICATION OF DISCRETE-TIME PROCESSES,
by C. A. Galtieri. 27 Dec 63, 144p ERL-63-19
Grant AF AFOSR292 63
AFOSR 64 1197

Unclassified report

Descriptors: (*Decision theory, Mathematical logic), (*Mathematical logic, Decision theory), (*Identification, Time), Metamathematics, Probability, Game theory, Statistical processes, Dynamic programming, Difference equations.

A logical framework is proposed within which the problem of identification of discrete-time processes may be defined in a precise and general way. The general solution is then derived and some of its most important applications are discussed in some detail. The report is essentially divided in three parts. In the first a well-defined language is introduced in order to be able to state the problem in an unequivocal way. The basic axioms and definitions of this part lead to the general results of which the following chapters are specialized applications. In the second part the problem of identification of discrete-time processes is specifically introduced and some of its general aspects are discussed. The final part discusses in some detail a number of specific cases of particular importance. Particular attention was given to the problem of estimating the coefficients of a difference equation. It is shown that two previously proposed methods of solution for this problem may be considered as approximations of the method proposed in this report. The numerical solution of some very simple examples is included for purposes of illustration. (Author)

AD-603 740 Div. 15
OTS Prices: HC $2.00/MF $0.50

Training Center for Experimental Aerodynamics, Rhode-Saint-Genese (Belgium).
NOTE ON THE USE OF CHEBYSHEV POLYNOMIALS FOR INTEGRATION OF ORDINARY DIFFERENTIAL EQUATIONS.
Scientific rept. no. 4,
by L. Moulin. Jun 64, 29p VKI-TN-18
Grant AF EOAR63 39
AFOSR 64 1293

Unclassified report

Descriptors: (*Differential equations, Integration), (*Polynomials, Numerical methods and procedures), Taylor's series, Nonlinear systems, Equations, Mathematics.

The problem of obtaining approximate solutions to ordinary differential equations is discussed with reference to methods which are already in existence. In addition, the possibility has been considered of using direct expansions in Chebyshev polynomials. The analysis indicates that such a method compares favourably with other methods, and may offer further advantages. It is also shown that its application can also be easily extended to the case of non linear equations. (Author)

AD-603 781 Div. 15
OTS Prices: HC $1.00/MF $0.50

Basel Univ. (Switzerland).
APPLICATIONS OF VARIATION-DIMINISHING MATRICES; A GENERAL RULE OF SIGNS; STUDIES ON THE NEWTON-SYLVESTER THEOREM.

SOME NON-PARAMETRIC TESTS OF WHETHER THE LARGEST OBSERVATIONS OF A SET ARE TOO LARGE OR TO SMALL,
by John E. Walsh. Rev. 27 Feb 50, 10p, P-61
Unclassified report

Descriptors: (*Statistical tests, Population (Mathematics)), (*Population (Mathematics), Statistical tests), Set theory, Measure theory, Probability, Number theory, Inequalities, Functions.

Considered is a large number n of observations which are statistically independent and drawn from continuous symmetrical populations. This paper presents some non-parametric tests of whether the r largest observations of the set are too large to be consistent with the hypothesis that these populations have a common median value. Tests of whether the r largest observations are to small to be consistent with this hypothesis are also considered. Here r is a given integer which is dependent of n. Subject to some weak restrictions, it is shown that the significance level of a test of the type presented tends to a value alpha as n increases. For no admissible value of n, however, does the significance level of this test exceed 2 alpha. If whether the largest observations are too large is considered, tests with values of a suitable for significance levels can be obtained for r > 4. Values of a suitable for significance levels can be obtained for any value of r if whether the largest observations are too small is investigated (n large).

AD-603 819 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME ESTIMATES AND TESTS BASED ON THE r SMALLEST VALUES IN A SAMPLE,
by John E. Walsh. Rev. 24 Feb 50, 6p P-65
Unclassified report

To be presented in person at the Annual Meeting of the Institute of Mathematical Statistics at New York City, December 27-30, 1949.

Descriptors: (*Statistical tests, Population (Mathematics)), Sampling, Statistical analysis, Theorems.

A situation where only the r smallest values of a sample of size n are available is considered. This paper investigates the case where n is large and r is of the form pn + 0 square root of n. Properties of some well known estimates and tests of the 100p% population point (based on statistics of the type used for the sign test) are investigated. If the sample is from a normal population, these non-parametric results have high efficiencies for small values of p (at least 95% if p < or = 1/10). Asymptotically 'best' estimates and tests of the population percentage points are derived for the case where the population variance is known. The results of the paper have application in the field of life testing.

AD-603 820 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
GAMES WITH CONTINUOUS, CONVEX PAY-OFF,
by H. F. Bohnenblust, S. Karlin, and L. S. Shapley.
Rev. 12 Aug 49, 20p P-66
Unclassified report

Descriptors: (*Game theory, Functions), (*Functions, Game theory), Convex sets, Decision theory, Economics, Probability, Distribution.

In the 'normal form' of a two-person, zero-sum game, as the theory has been set forth by von Neumann, there are just two moves. They are the choices of strategy, made simultaneously by each player. One player is then required to pay to the other an amount (positive or negative) determined by the pay-off function, which is a function only of the strategy-choices. The theory is best known at present for games in which the number of strategies available to each player is finite. This paper will explore a rather special class of games in which the strategies of one player form a compact and convex region B of finite-dimensional Euclidean space, while those of the other form an arbitrary set A. (Author)

AD-603 821 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ITERATES OF FRACTIONAL ORDER,
by Rufus Isaacs. 12 Apr 49, rev. 3 Nov 49,
13p P-73
Unclassified report

Descriptors: (*Iterative methods, Topology), (*Topology, Iterative methods), Mapping (Transformations), Functions, Algebraic topology.

This paper is concerned with the following question: Let E be any space whatever. g(x) is a function mapping E into E. When does there exist a function f(x), of the same type, such that f(f(x)) = g(x).

AD-603 822 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME APPLICATIONS OF A THEOREM ON CONVEX FUNCTIONS,
by S. Karlin and L. S. Shapley. 18 Apr 49, 10p P-74
Unclassified report

Descriptors: (*Functions, Theorems), (*Convex sets, Theorems), Set theory, Projective geometry, Spheres.

This paper presents several applications of the theory developed elsewhere (AD-603 820). The results established here depend upon a fundamental theorem on convex functions, previously used in relation to the Theory of Games. Certain extensions of Helly's theorem, approximation and fitting results, and covering theorems for the n dimensional unit sphere are obtained. All these are intrinsically connected with one another. The authors believe they possess independent interest. (Author)

AD-603 823 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME NOTES ON COMPUTATION OF GAMES SOLUTIONS,
by George W. Brown. 25 Apr 49, 7p P-78
Unclassified report

Descriptors: (*Game theory, Matrix algebra), (*Matrix algebra, Game theory), Differential equations, Difference equations, Linear programming.

This paper presents some dynamical systems whose steady state solutions yield solutions to a discrete game matrix. First a few systems of differential equations for the case of a symmetric game, then some more or less related systems of difference equations for digital computation are considered. Finally, a representation of the linear programming problem as a symmetric game is given. This representation serves also to represent asymmetric games in symmetric form. (Author)

AD-603 805 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE THEORY OF AGE-DEPENDENT STOCHASTIC BRANCHING PROCESSES,
by Richard Bellman and Theodore Harris.
Rev. 14 Jul 50, 47p P-38
Unclassified report

Expansion of results announced in Proceedings of the National Academy of Sciences, Vol. 34 (1948) pp. 601-604.

Descriptors: (*Stochastic processes, Transformations), (*Transformations, Stochastic processes), Statistical processes, Particles, Phase studies, Probability, Statistical functions, Integral equations, Theorems.

The following problem which is of possible biological, chemical and physical interest is investigated. A particle existing at time t sub 1 = 0 is assumed to have probabilities q sub n >or =0, of being transformed into n similar particles at some random time t > 0. Assume that a start is made with a single particle at t = 0. Under the hypothesis that any particle has a life-length probability distribution independent of its time of birth and of the number of other particles existing at this time, the problem is to determine the probability distribution of Z(t), the number of particles in existence at time t. The problem is restricted as far as detailed exposition goes, to the special case where only binary transformations occur; that is, one particle can be transformed only into two others. This is the most important case biologically, and the methods employed to deal with this case are easily extended to deal with the general case with n-ary transformations.

AD-603 807 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME BOUNDED SIGNIFICANCE LEVEL TESTS OF WHETHER THE LARGEST OBSERVATIONS OF A SET ARE TOO SMALL.
Preliminary rept.,
by John E. Walsh. 13 Oct 48, 3p P-42
Unclassified report

Descriptors: (*Statistical tests, Population (Mathematics), Sampling, Analysis of variance, Power, Functions.

AD-603 808 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME TESTS OF THE RANDOMNESS OF A MILLION DIGITS,
by Bernice Brown. 19 Oct 48, 22p P-44
Unclassified report

Descriptors: (*Sampling, Numbers), (*Probability, Numbers), Electromagnetic pulses, Pulse counters, Analog-to-digital converters, Distribution, Statistical analysis, Mathematics.

The randomness of a table of a million digits produced by a random digit generator was examined by applying four tests. The four tests were: (1) Frequency test, (2) Poker test, (3) Serial test and (4) Run test. The complete table of a million digits was subjected to the first two tests. The last two tests were applied to a sample of 50,000 digits from the table. All computations were accomplished by means of I. B. M. equipment. There was no evidence of any unusual divergence from the theoretical expectations in any of the tests. It would be difficult to construct a series of digits which would succeed in evading all four of these tests. The examination of the million digits did not reveal any bias. There was nothing to indicate that the digits were not being produced with equal probabilities. (Author)

AD-603 809 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ISOMORPHISM OF GAMES, AND STRATEGIC EQUIVALENCE,
by J. C. C. McKinsey. 22 Nov 48, 41p P-47
Unclassified report

Descriptors: (*Game theory, Mapping (Transformations)), (*Mapping (Transformations), Game theory), Set theory, Functions, Theorems.

The paper is concerned with the notion of strategic equivalence in the theory of games. The intuitive notion of strategic equivalence is rather vague; but it nevertheless happens to be sufficiently sharp, that a precise mathematical condition A can be specified, which is intuitively recognized to be necessary for strategic equivalence, and a precise mathematical condition B, which is intuitively recognized to be sufficient. It turns out, however, that B is a consequence of A: so, in actuality, it can be said that A (or B) is a necessary and sufficient condition for strategic equivalence. Attention will be devoted mainly to a detailed proof that A implies B. The paper falls into three sections. In the first section the important notions which will be used are introduced, and some arguments of an intuitive sort are given. In the second section, some lemmas of an algebraic or function theoretic nature which are to be used subsequently are established. The last section contains the theorems which establish the desired relation between A and B. (Author)

AD-603 812 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOLUTIONS OF DISCRETE, TWO-PERSON GAMES,
by L. S. Shapley, S. Karlin, and H. F. Bohnenblust.
14 Jan 49, 33p P-57
Unclassified report

Descriptors: (*Game theory, Matrix algebra), (*Matrix algebra, Game theory), Set theory, Convex sets, Geometry, Determinants, Algebra, Inequalities, Dynamic programming.

This paper proposes to investigate the structure of solutions of discrete, zero-sum, two-person games. For a finite game-matrix it is well known that a solution (i.e., a pair of frequency distributions describing the optimal mixed strategies of the two players) always exists. Moreover, the set of solutions is known to be a convex polyhedron, each of whose vertices corresponds to a submatrix with special properties. In Part I of the paper a fundamental relationship between the dimensions of the sets of optimal strategies is proven, and devote particular attention to the set of games whose solutions are unique. Part II solves the problem of constructing a game-matrix with a given solution. A number of examples and geometrical arguments are interspersed to illustrate the theory, and Part III describes the solutions of some matrices with special diagonal properties.

AD-603 814 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.

by M. Dresher, S. Karlin, and L. S. Shapley.
Rev. 13 Apr 50, 29p P-100

Unclassified report

Descriptors: (*Game theory, Polynomials), (*Polynomials, Game theory), Functions, Convex sets, Geometry, Theorems.

A basis is laid in this paper for a theory of two-person zero-sum games in which the payoff is a polynomial function P(x,y) of the two strategy variables x and y, the latter taking their values from closed, one-dimensional intervals.

AD-603 836 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON A GENERALIZATION OF THE BEHRENS-FISHER PROBLEM,
by John E. Walsh. 12 Sep 49, rev. 16 Nov 49,
12p P-102

Unclassified report

Descriptors: (*Statistical tests, Population (Mathematics)), (*Population (Mathematics), Statistical tests), Analysis of variance, Power, Functions, Sampling.

This paper considers a generalization of the Behrens-Fisher problem which appears to be approximated by many practical situations. A solution is presented for the generalized situation and some efficiency properties of this solution are investigated. (Author)

AD-603 837 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
METHODS OF SOLUTION IN GAME THEORY,
by Melvin Dresher. 29 Jul 49, 3p P-103

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Game theory, Matrix algebra), (*Matrix algebra, Game theory), Probability, Equations, Mathematical prediction, Iterative methods, Polynomials, Optimization, S-Matrix.

AD-603 838 Div. 15, 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TOTAL RECONNAISSANCE WITH TOTAL COUNTERMEASURES: SIMPLIFIED MODEL,
by Seymour Sherman. 5 Aug 49, 3p P-106

Unclassified report

Descriptors: (*Game theory, Countermeasures), (*Mathematical models, Game theory), Vector analysis.

AD-603 840 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONCERNING THE EFFECT OF SMALL CORRELATION ON CERTAIN LARGE SAMPLE TESTS AND CONFIDENCE INTERVALS FOR THE MEAN,
by John E. Walsh. 17 Nov 49, 8p P-112

Unclassified report

Descriptors: (*Sampling, Correlation techniques), (*Statistical tests, Sampling), Statistical analysis.

Most of the well known significance tests and confidence intervals for the population mean are based on the assumption of a random sample. The paper considers how the significance levels and confidence coefficients of a commonly used class of these tests and intervals are changed when the random sample requirement is violated and the number of observations is large. It is found that the introduction of even a slight amount of correlation can result in a substantial significance level and confidence coefficient change. Thus this class of tests and confidence intervals would seem to be of questionable practical value for large sets of observations. For two types of situations of practical interest, methods are outlined for obtaining large sample tests and confidence intervals for the mean which are not sensitive to the presence of correlation. These results are as efficient (asymptotically) as the tests and intervals they replace and are applicable to the general situation where the observations are not from the same population. (Author)

AD-603 841 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
HISTORY OF RAND'S RANDOM DIGITS, SUMMARY,
by George W. Brown. Jun 49, 6p P-113

Unclassified report

Descriptors: (*Probability, Numbers), (*Numbers, Probability), Pulse generators, Pulse counters, Electromagnetic pulses, Analog-to-digital converters, Statistical analysis.

Experimental probability problems, in connection with a diversity of applications, led to a desire for a large supply of random digits, of sufficiently high quality so that the user wouldn't have to question whether they were good enough for his particular application in the case of every different application. A random frequency pulse source was gated by a constant frequency pulse, about once a second, providing on the average about 100,000 pulses in one second. Pulse standardization circuits passed the pulses to a five place binary counter, so that in principle the machine is like a roulette wheel with 32 positions, making on the average about 3000 revolutions on each turn. A binary to decimal conversion was used, throwing away 12 of the 32 positions, and the resulting random digit was fed to an I. B. M. punch, yielding punched card tables of random digits. A detailed analysis of the randomness to be expected from such a machine was made by the designers and indicated that the machine should yield very high quality output. (Author)

AD-603 846 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A LARGE SAMPLE t-STATISTIC WHICH IS INSENSITIVE TO NON-RANDOMNESS,
by John E. Walsh. Rev. 8 Aug 50, 10p P-129

Unclassified report

Descriptors: (*Statistical tests, Statistical distributions), (*Sampling, Statistical tests), Statistical analysis, Population (Mathematics), Distribution theory, Analysis of variance, Theorems, Inequalities.

Most of the well known significance tests and confidence intervals for the population mean are based on the assumption of a random sample. This paper considers how the significance levels and confidence coefficients of the commonly used class of tests and intervals based on the

AD-603 824 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NOTES ON THE SOLUTION OF LINEAR SYSTEMS INVOLVING INEQUALITIES,
by George W. Brown. 3 Oct 49, 8p P-78-B
Unclassified report

Descriptors: (*Inequalities, Linear systems), Game theory, Matrix algebra, Geometry, Numerical analysis.

The problem of minimizing a linear function is considered.

AD-603 825 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE POWER FUNCTION OF THE 'BEST' t-TEST SOLUTION OF THE BEHRENS-FISHER PROBLEM,
by John E. Walsh. Rev. 20 Jun 49, 4p P-80
Unclassified report

Descriptors: (*Statistical tests, Distribution theory), Population (Mathematics), Analysis of variance, Sampling, Power, Functions.

The Behrens-Fisher problem is concerned with significance tests for the difference of the means of two normal populations when the ratio of the variances of the populations is unknown.

AD-603 826 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME TWO-PERSON GAMES INVOLVING BLUFFING,
by Richard Bellman and David Blackwell.
18 May 48, rev. 19 Jul 49, 11p P-84
Unclassified report

Descriptors: (*Game theory, Decision making), (*Decision making, Game theory), Statistical functions, Probability, Mathematical logic.

A systematic theoretical treatment of a two-person zero-sum poker game is presented.

AD-603 827 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON A THEOREM OF VILLE,
by H. F. Bohnenblust and S. Karlin.
27 May 49, 9p P-85
Unclassified report

Descriptors: (*Game theory, Convex sets), (*Convex sets, Game theory), Topology, Functional analysis, Theorems.

Among the several procedures which lead to the existence of the value of a discrete two persons, zero sum game - one is based on a theorem of Ville and another one is based on a fix point theorem of Kakutani. In the present paper these two theorems are extended under certain conditions to infinite dimensional spaces. The results are useful tools in the theory of non-discrete games.

AD-603 828 Div. 15, 16, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
LARGE SAMPLE TESTS AND CONFIDENCE INTERVALS FOR MORTALITY RATES,
by John E. Walsh. 8 Aug 49, rev. 24 Oct 49, 12p
P-86
Unclassified report

Descriptors: (*Life span, Probability), (*Sampling, Statistical tests), (*Statistical analysis, Probability), Statistical data, Economics, Factor analysis.

In computing mortality rates from insurance data, the unit of measurement used is frequently based on number of policies or amount of insurance rather than on lives. Then the death of one person may result in several units of 'death' with respect to the investigation; moreover, the number of units per individual may vary noticeably. Thus the usual large sample methods of obtaining significance tests and confidence intervals for the true value of the mortality rate are not applicable to these situations. If the number of units associated with each person in the investigation were known, accurate large sample results could be obtained; however, determination of the number of units associated with each individual would require an extremely large amount of work. The article presents some valid large sample tests and confidence intervals for the mortality rate which do not require much work and are reasonably efficient. More general situations are also considered. (Author)

AD-603 831 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE POWER FUNCTION OF TESTS OF PERCENTAGE POINTS BASED ON THE NON-CENTRAL t-STATISTIC,
by John E. Walsh. Rev. 8 Nov 49, 4p P-91
Unclassified report

Descriptors: (*Statistical tests, Statistical functions), Population (Mathematics), Equations.

The note considers the power function of one-sided tests of the 100 Beta % point of a normal population which are based on the non-central t-statistic. By combining two approximations given by Johnson and Welch, an approximate expression for the power function is obtained which has desirable properties from the viewpoint of power function comparisons. Use of this approximation is illustrated by several examples. (Author)

AD-603 832 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME COMMENTS ON THE EFFICIENCY OF SIGNIFICANCE TESTS,
by John E. Walsh. 29 Jul 49, 11p P-92
Unclassified report

Descriptors: (*Statistical tests, Effectiveness), Analysis of variance, Equations, Functions, Sampling, Population (Mathematics).

The paper investigates the power function implications of the estimate method of defining the efficiency of a test for several special cases where uniformly most powerful tests exist.

AD-603 834 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
POLYNOMIAL GAMES,

AD-603 881 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN ITERATIVE METHOD OF SOLVING A GAME,
by Julia Robinson. 1 Jun 50, 10p P-154
Unclassified report

Descriptors: (*Game theory, Iterative methods), Probability, Matrix algebra.

In the paper, demonstration is made of the validity of an iterative procedure suggested by George W. Brown for a two-person game. This method corresponds to each player choosing in turn the best pure strategy against the accumulated mixed strategy of his opponent up to then.

AD-603 882 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME BOUNDED SIGNIFICANCE LEVEL TESTS FOR THE MEDIAN,
by John Walsh. 16 Jun 50, 12p P-156
Unclassified report

Descriptors: (*Statistical tests, Statistical analysis), Population (Mathematics).

In practice it is often permissible to assume that the observations of a set are statistically independent and from continuous populations with a common median. Then the population median can be investigated by using the sign test. For small numbers of observations, however, the sign test does not furnish very many suitable significance levels. Also, some of the sign tests with suitable significance levels are not very efficient. The note presents some tests whose significance levels are only approximate but cover a wide range of suitable values. The significance levels of these tests are exactly determined if the populations are symmetrical; they are bounded otherwise. Some of these bounded significance level tests have high efficiencies. (Author)

AD-603 884 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
EXPECTATIONS, POSITIVE TRANSFORMATIONS AND TAUBERIAN THEOREMS,
by Richard Bellman and Theodore E. Harris.
20 Jun 50, 28p P-158
Unclassified report

Descriptors: (*Mathematical prediction, Theorems), (*Transformations (Mathematics), Matrix algebra), (*Series, Theorems), Probability, Integral transforms, Number theory, Differential equations, Vector analysis.

AD-603 887 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME STATISTICAL PROBLEMS CONNECTED WITH STOCHASTIC PROCESSES,
by T. W. Anderson and D. A. Darling.
14 Aug 50, 22p P-169
Unclassified report

Descriptors: (*Stochastic processes, Functions), Statistical distributions, Statistical analysis, Probability.

The statistical problem treated is that of testing the hypothesis that a sample of n independent, identically distributed random variables have the common continuous distribution function F(x) , specified in advance. In principle such tests will give confidence regions for the unknown distribution function, for if we have a test (based on the n observations) for every F(x) the confidence region will consist of those F(x) for which the corresponding hypotheses are not rejected. (Author)

AD-603 889 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TWO PERSON COOPERATIVE GAMES,
by John Nash. 9 Aug 50, 13p P-172
Unclassified report

Descriptors: (*Game theory, Functions), Bargaining, Probability.

The concept of a general two-person cooperative game is defined and a concept of a solution for such games is developed.

AD-603 890 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON AN INTEGRAL EQUATION,
by Richard Bellman and Richard Latter. 28 Aug 50, 11p P-173
Unclassified report

Descriptors: (*Integral equations, Theory), Functions, Polynomials, Inequalities, Integration, Numerical analysis, Calculus of variations, Special functions (Mathematical).

AD-603 893 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A LARGE SAMPLE TEST OF THE HYPOTHESIS THAT ONE OF TWO RANDOM VARIABLES IS STOCHASTICALLY LARGER THAN THE OTHER,
by A. W. Marshall. 21 May 51, 14p P-179
Unclassified report

Descriptors: (*Statistical tests, Numbers), (*Numbers, Statistical tests), Statistical functions, Stochastic processes, Power series, Sampling, Number theory.

AD-603 894 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME NON-PARAMETRIC RESULTS FOR EXPERIMENTAL DESIGNS,
by John E. Walsh. 16 Oct 50, 13p P-180
Unclassified report

Descriptors: (*Statistical tests, Experimental data), Design, Mathematical models, Statistical functions, Power, Functions, Correlation techniques.

In experimental designs, the quantities investigated are often grouped into blocks as a method of obtaining a higher precision for the experiment. This grouping may result in high correlation among observations within the same block. Also there may be substantial variance differences between

standard Student t-statistic are changed when the random sample requirement is violated and the number of observations is large. It is found that even a slight deviation from the random sample situation can result in a substantial significance level and confidence coefficient change. Thus this class of tests and confidence intervals would seem to be of questionable practical value for large sets of observations. Large sample tests and confidence intervals for the mean which are not sensitive to the random sample requirement are obtained for a situation of practical interest by development of a special type of t-statistic. These results are as efficient (asymptotically) as those based on the standard t-statistic for the case of a random sample. (Author)

AD-603 873 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A CLASS OF INTEGRAL EQUATIONS,
by Richard Latter. 1 Mar 50, 9p P-130
Unclassified report

Descriptors: (*Integral equations, Mathematics), Functions, Integrals, Polynomials, Integral transforms.

Solutions for three types of integral equations were found by application of the Wiener-Hopf technique.

AD-603 874 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON GAMES OF TIMING,
by Max Shiffman. 6 Sep 49, 39p P-131
Unclassified report

Descriptors: (*Game theory, Time), Integral equations, Differential equations, Linear systems, Optimization.

AD-603 875 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME TEST FOR COMPARING PERCENTAGE POINTS OF TWO ARBITRARY CONTINUOUS POPULATIONS,
by A. W. Marshall and John E. Walsh. rev. 2 Aug 50, 14p P-133
Unclassified report

Descriptors: (*Population (Mathematics), Statistical tests), (*Statistical tests, Population (Mathematics)), (*Sampling, Statistical tests), Probability, Statistical functions, Acceptability, Statistical analysis.

Samples are considered from two continuous populations, the first with unique 100 alpha % point theta sub alpha, the second with unique 100 beta % point phi sub beta. The two populations are not necessarily the same or even related. This paper presents some easily applied significance tests for theta sub alpha - phi sub beta which are approximately valid for moderate and large sized samples. The exact significance level of a test is not known but its value is determined within reasonably close limits. Efficiency properties of these tests are investigated for the special case of normal populations with known ratio of variances. The tests are found to be reasonably efficient if alpha and beta are not too large or too small. Since these tests are often valid for moderate as well as large sized samples, they may be of practical value. (Author)

AD-603 876 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON A THEOREM OF DOOB,
by T. E. Harris. 17 Apr 50, 10p P-139
Unclassified report

Descriptors: (*Statistical functions, Distribution theory), (*Statistical processes, Theorems), Population (Mathematics), Monte Carlo method, Stochastic processes, Series.

This note gives a justification for the interchange of limiting processes required in Doob's 'heuristic' approach to the Kolmogorov limiting distribution of the maximum deviation between a theoretical and an empirical distribution function. (Author)

AD-603 877 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOLUTIONS OF GAMES BY DIFFERENTIAL EQUATIONS,
by G. W. Brown and J. von Neumann. 19 Apr 50, 12p P-142
Unclassified report

Descriptors: (*Game theory, Differential equations), (*Differential equations, Game theory), Matrix algebra, Probability, Equations, Mathematical prediction, Digital systems, Analog systems, Digital computers.

A new proof for the existence of a value and of good strategies for a zero-sum two-person game is given. This proof seems to have some interest because of two distinguishing traits: (a) although the theorem to be proved is of an algebraical nature, a very simple proof obtains by analytical means; and (b) the proof is constructive in a sense that lends itself to utilization when actually computing the solutions of specific games. The procedure could be mechanized with relative ease, both for digital and for analogy methods. In the latter case it is probably much less sensitive to the precision of the equipment, than the somewhat related problem of linear equation solving or matrix inversion. (Author)

AD-603 880 Div. 15
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME MATHEMATICAL MODELS FOR BRANCHING PROCESSES,
by T. E. Harris. rev. 14 Jun 50, 54p P-152
Unclassified report

Descriptors: (*Mathematical models, Stochastic processes), (*Stochastic processes, Mathematical models), Measure theory, Probability, Iterative procedures, Statistical processes.

This paper considers a number of stochastic processes which have been used as models for branching phenomena. Particular concern was given to limiting theorems and limiting distributions giving the behavior of the systems studied after long periods of time. One pattern recurs often enough to make the following statement plausible, although a general mathematical formulation has not been given.

by William S. Jewell. 20 Feb 64, 28p ORC-64-3(RR)
Unclassified report

Descriptors: (*Operations research, Scheduling), (*Scheduling, Operations research), Optimization, Numerical analysis, Linear programming.

A critical path scheduling problem is investigated in which a single activity can have its completion time divided up and allocated to different 'locations' in the project precedence network. An algorithm for determining the allocation which minimizes total project duration is given, together with an outline of an optimality proof, and an example. Although the algorithm is very similar to those used in network-flow type problems, and uses only integer-valued variables, the final results for the divisible-activity network are, in general rational numbers. (Author)

AD-603 974 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A TALE OF PROBABLE REGIONS (A STATISTICAL ALLEGORY),
by Richard Zeckhauser. Aug 64, 6p P-2951
Unclassified report

Descriptors: (*Probability, Statistical analysis), (*Statistical analysis, Statistical tests).

AD-603 980 Div. 15
OTS Prices: HC $4.00/MF $0.75

RAND Corp., Santa Monica, Calif.
GEOMETRY OF MOMENT SPACES,
by S. Karlin and L. S. Shapley. 23 Jul 51, 105p P-227
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Geometry, Convex sets), (*Convex sets, Geometry), Statistical functions, Polynomials, Convex bodies, Game theory.

This paper presents a natural geometrical approach to the theory of reduced moment spaces and its application to orthogonal polynomials. The work is concerned primarily with distribution functions on a finite interval.

AD-603 981 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON SOME DYNAMIC LINEAR PROGRAMMING PROBLEMS,
by Richard Bellman. 10 Aug 51, 11p P-230
Unclassified report

Descriptors: (*Dynamic programming, Linear programming), (*Linear programming, Dynamic programming), Probability, Stochastic processes, Sequential analysis.

A study is made of a class of mathematical problems connected with physical situations which require that a finite or unbounded sequence of operations be performed for the purpose of achieving a desired result. The only case considered here is that in which each operation performs a mapping of the parametric space onto itself. (Author)

AD-603 982 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NOTE ON A CLASS OF INTEGRAL EQUATIONS RELATED TO THE BESSEL AND MATHIEU FUNCTIONS,
by Richard Bellman. 24 Aug 51, 9p P-233
Unclassified report

Descriptors: (*Integral equations, Functions), (*Special functions (Mathematical), Integral equations), (*Bessel functions, Integral equations), Series.

AD-603 983 Div. 15, 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A GAME OVER FUNCTION SPACE,
by J. M. Danskin and L. Gillman. Rev. 16 Feb 53, 19p P-235
Unclassified report

Descriptors: (*Game theory, Functions), Topology, Probability, Theorems, Optimization, Military strategy.

The paper is concerned with a specific zero-sum two-person game over function space, to which is found an explicit saddle-point solution.

AD-603 986 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE FIRST PASSAGE PROBLEM FOR A CONTINUOUS MARKOFF PROCESS,
by D. A. Darling and A. J. F. Siegert. Rev. 2 Mar 53, 32p P-238
Unclassified report

Descriptors: (*Stochastic processes, Numerical analysis), Integral transforms, Probability, Sequential analysis, Distribution theory.

The solution to the first passage problem for a strongly continuous temporally homogeneous Markoff process X(t) is given. If T = T sub ab (x) is a random variable giving the time of first passage of X (t) from the region a > X(t) > b when a > X(0) = x> b, simple methods of getting the distribution of T (at least in terms of a Laplace transform) are developed. From the distribution of T the distribution of the maximum of X(t) and the range of X(t) are deduced. These results yield, in an asymptotic form, solutions to certain statistical problems in sequential analysis, non-parametric theory of 'goodness of fit,' optional stopping, etc. which are treated as an illustration of the theory. (Author)

AD-603 988 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
REDUCTION OF CERTAIN CLASSES OF GAMES TO INTEGRAL EQUATIONS,
by Samuel Karlin. 9 Oct 51, 42p P-241
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Game theory, Integral equations), (*Integral equations, Game theory), Numerical methods and procedures, Statistical functions.

blocks. Then the t-statistic is not necessarily applicable for comparing the effects of the treatments under investigation. This paper presents some non-parametric results which are usually valid for a well known type of experimental design if there is statistical independence among blocks (number of blocks > or = 4). These non-parametric results are reasonably efficient, compared to those based on the t-statistic, for the case where the totality of observations are independent, normally distributed, and have the same variance. High precision can sometimes be obtained by designing the experiment to yield large positive correlation within blocks and then using the non-parametric results. (Author)

AD-603 896 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON CERTAIN GAMES WITH TRANSCENDENTAL VALUES,
by Oliver Gross. 13 Nov 50, 3p P-188
Unclassified report

Descriptors: (*Game theory, Optimization), (*Numbers, Game theory), Algebra, Set theory, Distribution theory, Probability, Statistical functions.

AD-603 898 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON APPROXIMATE EXPRESSIONS FOR THE EXPONENTIAL INTEGRAL AND THE ERROR FUNCTION,
by Richard Bellman. 19 Sep 50, 11p P-175
Unclassified report

Descriptors: (*Integrals, Numerical analysis), (*Numerical analysis, Integrals), (*Special functions (Mathematical), Numerical analysis), Complex numbers, Inequalities, Polynomials, Integral transforms.

AD-603 907 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A FURTHER GENERALIZATION OF THE KAKUTANI FIXED POINT THEOREM, WITH APPLICATION TO NASH EQUILIBRIUM POINTS,
by I. L. Glicksberg. 9 Feb 51, 9p P-193
Unclassified report

Descriptors: (*Game theory, Convex sets), (*Convex sets, Game theory), (*Topology, Theorems), Set theory, Mapping (Transformations).

Kakutani's Fixed Point Theorem states that in Euclidean n-space a closed point to (non-void) convex set map of a convex compact set into itself has a fixed point. Kakutani showed that this implied the minimax theorem for finite games. The object of this note is to point out that Kakutani's theorem may be extended to convex linear topological spaces, and implies the minimax theorem for continuous games with continuous payoff as well as the existence of Nash equilibrium points.

AD-603 915 Div. 15, 25
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FIRST PASSAGE AND RECURRENCE DISTRIBUTIONS,
by T. E. Harris. 14 Dec 51, 28p P-207
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Numerical analysis, Probability), (*Statistical distributions, Probability), Moments, Quantum mechanics, Mathematical prediction, Perturbation theory.

A random walk on the integers is considered with transition probabilities p sub k for the transition k to k + 1 and 1 - p sub k for the transition k to k - 1. Distributions and moments are found for the length of time required to travel between any two given states. Some limiting results, applicable to more general results, are given. (Author)

AD-603 918 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DRESHER'S INEQUALITY,
by J. M. Danskin. 18 May 51, 5p P-212
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Inequalities, Theory), (*Statistical functions, Inequalities), Distribution theory, Integrals, Transformations (Mathematics).

This note gives an elementary proof of the Dresher inequality, based on the Minkowski inequality and an inequality due to Radon. The Radon inequality is gotten easily by transforming the Holder inequality; thus Dresher's inequality is seen to be a melange of the Holder and Minkowski inequalities. It is appropriate to note here that Dresher's inequality is a generalization of an inequality due to Beckenbach.

AD-603 919 Div. 15, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE HITCHCOCK DISTRIBUTION PROBLEM,
by Merrill M. Flood. rev., Dec 51, 22p P-213
Unclassified report

Descriptors: (*Distribution (Economics), Linear programming), (*Linear programming, Scheduling), (*Scheduling, Linear programming), Matrix algebra, Calculus of variations, Graphics, Set theory.

AD-603 926 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE ITERATION OF POWER SERIES IN TWO VARIABLES,
by Richard Bellman. 5 Jul 51, 14p P-225
Unclassified report

Descriptors: (*Power series, Iterative methods), (*Iterative methods, Power series), Functions, Matrix algebra, Integral equations, Transformations (Mathematics).

AD-603 940 Div. 15
OTS Prices: HC $2.00/MF $0.50

Operation Research Center, Univ. of California, Berkeley.
DIVISIBLE ACTIVITIES IN CRITICAL PATH ANALYSIS,

AD-604 004 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN ITERATIVE METHOD OF COMPUTING THE Q-FUNCTION,
by L. E. Brennan and I. S. Reed. Jul 64, 8p, P-2949
Unclassified report

Descriptors: (*Iterative methods, Special functions), (*Special functions, Iterative methods), Numerical methods and procedures, Numerical analysis, Bessel functions, Series, Integration.

Interpolation of tables to obtain accurate (e.g., 1 part in 10000) estimates of the Q-function is difficult, and in machine computations involving the Q-function, requires the storage of Q values at closely spaced grid points, interpolation using higher order polynomials for curve fitting, or a combination of the two. An iterative procedure is described which is well suited for rapid machine computation of the Q-function. (Author)

AD-604 005 Div. 15
OTS Prices: HC $1.00/MF $0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
PARTIAL DIFFERENTIAL EQUATIONS FOR DENSITIES OF RANDOM PROCESSES,
by Terrence Fine. 4 May 64, 12p Cruft-TR-445
Contract Nonr1866 16, Proj. NR372 012
Unclassified report

Descriptors: (*Partial differential equations, Stochastic processes), (*Stochastic processes, Partial differential equations), Equations, Statistical functions, Statistical processes, Probability, Numerical methods and procedures.

The Fokker-Planck-Kolmogorov (FPK) equation appears to be of wider applicability than is commonly realized. It is proved that the density functions for a wider class of vector random processes than just the Markov processes satisfy the FPK equation. Furthermore, an analogous derivation will yield a different partial differential equation applicable to multivariate densities for scalar random processes. The central technique is the evaluation of time derivatives of the characteristic function for the random variables of interest by two different methods; the comparison of the two different expressions for the time derivatives then yields the desired partial differential equations. (Author)

AD-604 006 Div. 15
OTS Prices: HC $1.00/MF $0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
A BAYESIAN APPROACH TO PROBLEMS IN STOCHASTIC ESTIMATION AND CONTROL,
by Yu-Chi Ho and Robert C. K. Lee. 9 Jun 64, 7p
Cruft-TR-448
Contract Nonr1866 16, Proj. NR372 012
Unclassified report

Descriptors: (*Stochastic processes, Control), (*Decision theory, Mathematical prediction), Statistical processes, Probability, Functions, Noise.

A general class of stochastic estimation and control problems is formulated from the Bayesian Decision-Theoretic viewpoint. A discussion as to how these problems can be solved step-by-step in principle and practice from this approach is presented. As a specific example, the closed form Wiener-Kalman solution for linear estimation in gaussian noise is derived. The purpose of the paper is to show that the Bayesian approach provides: (i) a general unifying framework within which to pursue further researches in stochastic estimation and control problems, (ii) the necessary computations and difficulties that must be overcome for these problems. An example of nonlinear, non-gaussian estimation problem is also solved. (Author)

AD-604 012 Div. 15
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif. School of Humanities and Sciences.
THE QD-ALGORITHM AS A METHOD FOR FINDING THE ROOTS OF A POLYNOMIAL EQUATION WHEN ALL ROOTS ARE POSITIVE.
Technical rept.
by Chr. Andersen. 8 Jun 64, 85p CS9
Contract Nonr225 37, Proj. NRO44 211
Unclassified report

Descriptors: (*Polynomials, Numerical analysis), Continued fractions, Equations, Matrix algebra, Determinants, Functions, Numerical methods and procedures.

The Quotient-Difference (QD)-scheme, symmetric functions and some results from the theory of Hankel determinants are treated. Some well known relations expressing the elements of the QD-scheme by means of the Hankel determinants are presented. The question of convergence of the columns of the QD-scheme is treated. An exact expression for q sub n(k) is developed for the case of different roots. It is proved that the columns of the QD-scheme will converge not only in the well known case of different roots, but in all cases where the roots are positive. A detailed examination of the convergence to the smallest root is presented. An exact expression for q sub n(N) is developed. This expression, is correct in all cases of multiple positive roots. It is shown that the progressive form of the QD-algorithm is only 'mildly unstable'. Finally, some ALGOL programs and some results obtained by means of these, are given.

AD-604 041 Div. 15
OTS Prices: HC $1.00/MF $0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
WIDE-SENSE MARKOFF SEQUENCES AND RECURSIVE FILTERING,
by A. Papoulis. 25 Jun 64, 14p PIBMRI-1230-64, PIBMRI M-70
Contract AF49 638 1402
AFOSR 64 1375
Unclassified report

Descriptors: (*Sequences, Mathematical prediction), Stochastic processes, Difference equations, Noise, Signals.

In the introductory section of the paper, the orthogonality principle for random variables is stated and proved. This principle is the basis of all linear mean square estimations. In the second section, a number of basic properties of wide-sense Markoff sequences is given. It is finally shown that recursive filtering is an immediate consequence of the orthogonality principle. (Author)

AD-604 042 Div. 15, 8, 30
OTS Prices: HC $1.00/MF $0.50

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.

This paper investigates the relationship of certain classes of games with corresponding integral equations. The essential part of the optimal strategies is obtained by solving associated integral equations. Part I treats the general game of timing. The second part examines payoff kernels which are concave on each side of the diagonal x=y. (Author)

AD-603 990 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN ANALYSIS OF THREE-MOVE FINITE GAMES,
by M. Dresher, O. Helmer and R. Wagner.
16 Oct 51, 12p P-245
Unclassified report

Descriptors: (*Game theory, Functional analysis), Determinants, Mathematical logic, Distribution theory.

The complexity of possible information patterns increases with the number of moves available to the players. If it is assumed that a move is made with either complete or no knowledge about the other move, a 2-move game has only two possible patterns of information. Either there is perfect information, and thus one move precedes the other, or there is no information, in which case the moves are in effect made simultaneously. In each case the game has a value and optimal strategies, - - a pure strategy in the case of perfect information, and generally mixed strategies if the moves are made simultaneously. A 3-move game, i. e., one in which two moves are made by one player and one by the other, introduces many additional types of information patterns. Again, it is assumed that information, if any, about a preceding move is complete. At the time of his second move, the player with two moves may have forgotten his first move or the information known at this first move. The effect of this introduction of imperfect recall is to yield a game without a value. Further, in these cases it is generally impossible to express the 3-move game in normal form. (Author)

AD-603 992 Div. 15, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DEFINITE AND SEMI-DEFINITE QUADRATIC EQUATIONS.
Cowles Commission Discussion Paper, Mathematics,
by Gerard Debreu. 6 Sep 51, 1 p P-247; Cowles DP-408
Unclassified report

Rept. on Proj. RAND. This paper is a result of work done at the Cowles Commission for Research in Economics on the 'Theory of Resource Allocation,' to be reprinted as Cowles Commission Discussion paper, new series, no. 58.

Descriptors: (*Equations, Economics), Matrix algebra, Functions.

AD-603 993 Div. 15
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE THEORY OF INFINITE GAMES,
by Samuel Karlin. 18 Oct 51, 55p P-248
Unclassified report

Descriptors: (*Game theory, Mathematical analysis), Operators (Mathematics), Functional analysis, Linear programming, Mapping (Transformations).

This paper develops in an abstract way the theory of infinite games. The kernel is replaced by an operator and the distributions by suitably chosen Banach spaces and the complete theory of the determiteness of a game is studied. Both weak and uniform upper and lower values are introduced and are related. A study of Bayes solutions are given and an analysis of the change of the value under pertubation of the operator is pursued. Some new examples of determinate games are presented to illustrate the general theory. A further discussion on non-linear games and the Wald Theory is also given. Games invariant under groups of transformations are also discussed. The usual terminology of the theory of games developed in the Annals of Mathematics Studies 24 is freely employed. A future paper on the applications of this theory to statistical decision functions is intended. (Author)

AD-603 995 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON A CLASS OF GAMES,
by Samuel Karlin. 16 Nov 51, 17p, P-254
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Game theory, Functions), Numerical methods and procedures, Mathematical logic, Theorems.

This paper describes qualitatively the nature of optimal strategies for a payoff kernel K(x,y) defined on the unit square satisfying K sub y...y (x,y) > or = 0 with n partial derivatives taken with respect to y. A complete analysis for n < or = 4 is presented. However, the method employed easily extends and enables, by enumerating cases, the situation for general n to be solved. Specifically, it is shown that for n = 3 and n = 4 the maximizing player has optimal strategies involving respectively at most 3 points and at most 4 points of increase. For general n, it can be shown that the maximizing player has optimal strategies using at most n points. For the minimizing player the statement of the nature of an optimal strategy is more precise. There always exist for the general case optimal solutions using at most n/2 points, with the understanding that the end points 0 or 1 when used are each counted only half. For example when n is odd, then n/2 is a half integer and hence must use a single end point if a full optimal strategy exists employing n/2 points. This counting procedure applies only to the minimizing strategies. (Author)

AD-603 996 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOLUTIONS OF CONVEX GAMES AS FIXED-POINTS,
by M. Dresher and S. Karlin. 12 Nov 51, 17p, P-255
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Game theory, Convex sets), (*Convex sets, Game theory), Mapping (Transformations), Theorems, Numerical analysis.

An optimal strategy of a game is viewed mathematically as a fixed-point in a continuous mapping. Using this interpretation, some general dimensional properties of solutions are derived for games played over arbitrary convex sets. By mapping one convex set onto another, it is shown, with examples, how to compute the solutions of a game. (Author)

Descriptors: (*Sampling, Analysis of variance), (*Analysis of variance, Population (Mathematics)), (*Population (Mathematics), Sampling).

The situation considered is that of testing the difference of the means of two normal populations on the basis of a sample from each population, where the ratio of the population variances is known. The choice of sample sizes has been restricted to certain pairs which are equally preferable from the viewpoint of practical considerations (cost, difficulty of obtaining sample values, etc.). This note presents an easily applied method of determining which of these pairs of sample sizes yield the most powerful one-sided and symmetrical tests. (Author)

AD-604 075 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE ASYMPTOTIC EFFICIENCY OF CERTAIN NONPARAMETRIC TWO-SAMPLE TESTS,
by A. M. Mood. 17 Mar 52, 18p P-280
Unclassified report

Descriptors: (*Statistical tests, Sampling), (*Sampling, Statistical tests), Population (Mathematics), Distribution theory, Analysis of variance, Functions, Statistical analysis.

In this paper the following asymptotic efficiencies are computed for the given two-sample tests against normal alternatives to the null hypothesis: rank test for location 3/pi, median test for location 2/pi, run test for location 0, run test for dispersion 0, and square rank test for dispersion 15/2 sq. pi. (Author)

AD-604 082 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN EXTENSION OF THE BROWN-ROBINSON ITERATIVE PROCESS FOR FINDING THE VALUE OF A GAME,
by J. M. Danskin. 9 Apr 52, 16p P-293
Unclassified report

Descriptors: (*Iterative methods, Game theory), (*Game theory, Iterative methods), Functions, Sequences. Mathematical analysis.

Brown conjectured, and Robinson proved the validity of an iterative process for finding the value of a finite zero-sum two-person game. It is the purpose of this paper to show that the corresponding process is valid for zero-sum two-person games with continuous payoffs, played over the direct product of arbitrary compact spaces. (Author)

AD-604 084 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A VALUE FOR n-PERSON GAMES,
by L. S. Shapley. 18 Mar 52, 14p P-295
Unclassified report

Descriptors: (*Game theory, Mathematical analysis), Set theory, Functions, Theorems.

In the finite theory of von Neumann and Morgenstern difficulty in evaluation persists for the essential games, and for only those. In this paper a value is deduced for the essential case and a number of its elementary properties are examined. A set of three axioms, having simple intuitive interpretations, which suffice to determine the value uniquely serves as a starting point.

AD-604 085 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
QUOTA SOLUTIONS OF n-PERSON GAMES,
by L. S. Shapley. 7 Apr 52, 25p P-297
Unclassified report

Assisted by the Office of Naval Research.

Descriptors: (*Game theory, Mathematical analysis), Set theory, Convex sets, Functions, Mapping (Transformations), Theorems.

A family of solutions for a class Q of n-person games which embraces all constant-sum four-person games and a not inconsiderable array of higher games is presented. They are called 'quota games' because it is possible in them to define a system of individual quotas for the players which determines the effectiveness of the various two-player coalitions. In the solutions most of the players receive their quotas, but there is some latitude for bargaining. The solutions are typically one-dimensional sets, consisting sometimes of n line segments joined at the quota point, sometimes of n - 1 disconnected segments. Their behavior under variation of the characteristic function of the game is continuous. (Author)

AD-604 096 Div. 15
OTS Prices: HC $1.00/MF $0.50

Coordinated Science Lab., Univ. of Illinois, Urbana.
THE SENSITIVITY OF GENERAL MULTIVARIABLE FEEDBACK SYSTEMS,
by J. B. Cruz, Jr. and W. R. Perkins. Aug 64, 14p
CSL-R-227
Contracts DA28 043AMC00073E, AF49 638 1383
Unclassified report

Descriptors: (*Control systems, Feedback), (*Mathematical analysis, Control systems), Calculus of variations, Statistical analysis, Linear systems, Functions, Sensitivity, Matrix algebra.

The new approach recently proposed by the authors for treating the parameter variation problem for a class of multivariable systems is extended to a general feedback configuration for multivariable systems. It is shown that the general linear, multivariable, feedback system can be represented by two plant transfer function matrices and three controller transfer function matrices. A formula for the sensitivity matrix of the general structure is derived. Also, sufficient conditions are obtained for assuring a feedback design that is less affected by parameter variations than another feedback design with the same overall transfer matrix. (Author)

AD-604 129 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A SOCIAL EQUILIBRIUM EXISTENCE THEOREM,
by Gerard Debreu. 24 Apr 52, 12p P-303
Unclassified report

Descriptors: (*Game theory, Mathematics), Economics, Set theory, Transformations.

CONSTRAINT ANALYSIS OF MANY-DIMENSIONAL RELATIONS.
Technical rept. no. 2,
by W. Ross Ashby. May 64, 22p
Grant AF AFOSR7 63
AFOSR 64 1387

Unclassified report

Descriptors: (*Set theory, Communication theory), (*Communication theory, Set theory), Cybernetics, Combinatorial analysis.

As part of an attempt to apply information theory to the internal activities of large systems, a preliminary study was made of the simplifications possible when the data about the linkage between variables was merely whether the linkage was zero or non-zero. The study thus became a study of how to simplify an n-ary relation. Relations between large numbers of variables are often not as complex as they seem, for they are often constructed from simpler sub-relations, and retain something of their simplicity. The idea is here treated rigorously, and a method is developed for detecting and measuring the degree of essential simplicity. The individual relation is made to generate a sequence of progressively simpler relations; where it comes in the sequence determines and measures its degree of essential simplicity. The method may be useful when one wishes to consider relations (or systems) that, while involving very large numbers of variables, retain some simplicity derived from the sub-relations that formed them. (Author)

AD-604 044 Div. 15, 20
OTS Prices: HC $2.00/MF $0.50

Cambridge Language Research Unit (England).
A BROUWER TYPE SPACE TO REPLACE THE CONVENTIONAL PHYSICAL CONTINUUM WHEN PARTICLES ARE REGARDED AS DISTINCTION SYSTEMS,
by E. W. Bastin and C. W. Kilmister. Nov 63, 34p
Contract AF61 052 331
AFOSR 64 1380

Unclassified report

Descriptors: (*Sequences, Mapping (Transformations)), (*Mapping (Transformations), Sequences), Matrix algebra, Transformations (Mathematics), Set theory, Particles, Nuclear physics.

An ordered distinction system arises when entities specified by a set of properties each of which may be present or absent are considered, and when the growth of our knowledge in time is taken into account. It is shown that all such systems have certain sets of integers corresponding to them, and the structure of these sets is considered. (Author)

AD-604 045 Div. 15
OTS Prices: HC $5.00/MF $1.00

Illinois Univ., Urbana. Engineering Experiment Station.
ON STRUCTURAL ANALYSIS OF MANY VALUED LOGIC,
by H. S. H. Na, H. Von Foerster, and G. Günther.
Apr 64, 169p
Grant AF AFOSR8 63
AFOSR 64 1381

Unclassified report

Descriptors: (*Mathematical logic, Functions), (*Functions, Mathematical logic), Set theory, Statistical distributions, Synthesis.

Traditional logic deals with systems of two binary variables, i.e., each variable being two valued. Boolean system deals with n binary variables. In this paper systems with n variables, each being m valued, are studied. Such systems are divided into three classes: balanced, whenever n = m; under-balanced, whenever m < n; and over-balanced whenever m > n. Some of the structural properties of these systems, e.g., reducibility and decomposability, as well as those of the components (i.e., individual functions), e.g., resolvability are considered. Relations among various (m, n)-systems are partially established. (Author)

AD-604 059 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE POWER FUNCTION OF A SIGN TEST FORMED BY USING SUBSAMPLES,
by John E. Walsh. 7 Jan 48, 18p P-7

Unclassified report

Prepared in cooperation with Douglas Aircraft Co., Inc.

Descriptors: (*Statistical tests, Special functions), (*Special functions, Statistical tests), Sampling, Population (Mathematics), Set theory, Power, Functions, Statistical analysis.

The sign test can be used to obtain significance tests for the population median under extremely general conditions. The purpose of this paper is to investigate the power efficiency of the significance tests for the median formed in this way for the particular case in which each observation is drawn from the same normal population. For the cases considered, it is found that the power efficiency is almost always decreased by using two or more subsets rather than all the observations as a single set; sometimes this decrease in power efficiency is very large. Also, for a given significance level, it is found that the power efficiency can vary noticeably with the manner in which the test is formed. (Author)

AD-604 060 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE 'INFORMATION' LOST BY USING t-TEST WHEN THE POPULATION VARIANCE IS KNOWN,
by John E. Walsh. Rev. 25 Mar 48, 9p P-8

Unclassified report

Prepared in cooperation with Douglas Aircraft Co., Inc.

Descriptors: (*Statistical tests, Special functions), Sampling, Population (Mathematics), Functions, Statistical analysis.

This paper calls attention to the use of the operating characteristic function as a means of determining how much 'information' is lost by using some other test in place of the most powerful test of a given hypothesis. As an example of the method, the case of using a t-test for the mean of a normal population with known variance is analyzed. (Author)

AD-604 063 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE BEST CHOICE OF SAMPLE SIZE FOR A t-TEST WHEN THE RATIO OF VARIANCES IS KNOWN,
by John E. Walsh. Rev. 5 Jan 64, 7p P-32 Unclassified report

A BAYES MODEL IN SEQUENTIAL DESIGN,
by Samuel Karlin and S. M. Johnson. 4 Jan 54, 30p P-328, rev.
Unclassified report

Descriptors: (*Sequential analysis, Decision theory), (*Decision theory, Sequential analysis), Probability, Distribution theory, Functions, Game theory.

This paper is concerned with the Bayes problem of how to maximize the expected number of successes in N trials when at each trial we are free to choose between two machines I and II whose probabilities rho sigma of success are unknown but have a known a priori distribution F(rho sigma).

AD-604 146 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON A FUNCTIONAL EQUATION OCCURRING IN THE THEORY OF DYNAMIC PROGRAMMING,
by Richard Bellman. 30 Sep 52, 24p P-329
Unclassified report

Descriptors: (*Dynamic programming, Equations), Operations research, Theory, Functions, Probability, Series, Nonlinear systems.

Consideration is given to a functional equation which arises in connection with dynamic programming problems involving non-linear utility functions. (Author)

AD-604 147 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOLUME 2,
by Cecil Hastings, Jr. 24 Sep 52, 8p P-330
Unclassified report

Descriptors: (*Numerical analysis, Functions), (*Functions, Numerical analysis), Numerical methods and procedures.

A series of approximations of the higher mathematical functions are presented.

AD-604 151 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MULTIDIMENSIONAL UTILITIES,
by Melvin Hausner. 20 Aug 52, rev. May 53, 24p P-336
Unclassified report

Descriptors: (*Game theory, Mathematical analysis), Convex sets, Matrix algebra, Theorems.

A generalization of the von Neumann and Morgenstern theory of utility, by omission of the Archimedean postulate, and an extension to the infinite dimensional case are given. (Author)

AD-604 152 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON MAXIMIZING AN INTEGRAL WITH A SIDE CONDITION,
by R. C. Emerson. 20 Oct 52, rev. Jul 53, 8p P-338
Unclassified report

Descriptors: (*Integrals, Calculus of variations), (*Calculus of variations, Integrals), Functions, Set theory, Theorems.

The problem to be discussed is that of finding an admissible function, p(x), which makes an integral an absolute maximum subject to a side condition.

AD-604 154 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOLUME 3,
by Cecil Hastings, Jr. 30 Oct 52, 6p P-340
Unclassified report

Descriptors: (*Numerical analysis, Functions), (*Functions, Numerical analysis), Special functions (Mathematical), Bessel functions, Probability, Numerical methods and procedures.

Analytical approximations of offset circle probability functions and Bessel functions are presented.

AD-604 155 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NOTE ON PRIMITIVE MATRICES,
by I. N. Herstein. 12 Nov 52, 6p P-344
Unclassified report

Descriptors: (*Matrix algebra, Theorems), Determinants, Algebra.

Suppose that A is a square matrix consisting of non-negative elements. In certain considerations it is important to know when all the elements of some power of A are strictly positive. Frobenius gave a very simple necessary and sufficient condition for this to happen. In this paper a simple proof of this result is given. This proof is algebraic in nature and avoids the use of the convergence of powers of a matrix.

AD-604 158 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOLUME 4,
by James P. Wong, Jr. and Cecil Hastings, Jr. 24 Nov 52, 6p P-348
Unclassified report

Descriptors: (*Numerical analysis, Functions), (*Functions, Numerical analysis), Special functions (Mathematical), Bessel functions, Probability, Numerical methods and procedures.

Analytical approximations of offset circle probability functions and Bessel functions are given.

AD-604 160 Div. 15, 28
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.

In a wide class of social systems each agent has a range of actions among which he selects one. His choice is not however entirely free and the actions of all the other agents determine the subset to which his selection is restricted. Once the action of every agent is given, the outcome of the social activity is known. The preferences of each agent yield his complete ordering of the outcomes and each one of them tries by choosing his action in his restricting subset to bring about the best outcome according to his own preferences. The existence theorem presented here gives general conditions under which there is for such a social system an equilibrium, i.e., a situation where the action of every agent belongs to his restricting subset and no agent has incentive to choose another action.

AD-604 132 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NEW CURRENTS IN AN OLD STREAM,
by Frederick B. Thompson. 2 Jul 52, 12p P-306
Unclassified report

Descriptors: (*Game theory, Mathematics), (*Mathematics, Game theory).

The paper gives a simple explanation of some of the notions of game theory as an example of new developments in mathematics. (Author)

AD-604 136 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE RAND COLLECTION OF ILLUSTRATIVE APPROXIMATIONS,
by Cecil Hastings, Jr. 7 Aug 52, 5p P-314
Unclassified report

Descriptors: (*Transcendental functions, Numerical analysis), (*Numerical analysis, Transcendental functions), Numerical methods and procedures, Graphics.

Loose leaf sheets that contain interesting and useful approximations to a number of the higher transcendental functions are discussed. A sample sheet is displayed, somewhat reduced photographically from its original notebook size. The approximations given are of both a practical and of an illustrative nature. The sheets of approximations give interesting information concerning the location of roots - points at which function and approximation agree - and the location of extremals - points at which the deviation between function and approximation is locally a maximum in an absolute or relative sense. The error curves that appear on each sheet gives an analytical approximation in a wide variety of typical cases of practical importance.

AD-604 138 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS,
by Cecil Hastings, Jr. 12 Aug 52, 3p P-317
Unclassified report

Descriptors: (*Numerical analysis, Functions), (*Functions, Numerical analysis), Numerical methods and procedures.

A series of approximations of the higher mathematical functions are presented.

AD-604 139 Div. 15, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NON-NEGATIVE SQUARE MATRICES,
by Gerard Debrue and I. N. Herstein. 11 Aug 52, 18p P-318
Unclassified report

Research undertaken under contract between the Cowles Commission for Research in Economics and The RAND Corp.

Descriptors: (*Matrix algebra, Economics), Equations, Probability, Theorems.

Non-negative indecomposable matrices are studied from the point of view of the Brouwer fixed point theorem; a concise proof of their basic properties is thus obtained. Properties of a general non-negative square matrix A are derived from those of non-negative indecomposable matrices. Theorems about the matrix sI-A are proved; they cover in a unified manner a number of results recurringly used in economics. A systematic study of the convergence of A(P) when p tends to infinity (A is a general complex matrix) is linked to combinatorial properties of non-negative square matrices.

AD-604 140 Div. 15, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN AXIOMATIC APPROACH TO MEASURABLE UTILITY,
by I. N. Herstein and John Milnor. 12 Aug 52, 11p P-319
Unclassified report

Research undertaken under contract between the Cowles Commission for Research in Economics, The RAND Corp., and Office of Naval Research.

Descriptors: (*Measure theory, Theorems), (*Economics, Measure theory), Set theory, Convex sets, Functions, Equations.

Previous treatments of this approach brought topological considerations of the prospects space into the axioms. In this paper considerations of the topology of the prospect space itself are removed, the previous axioms are weakened an infinite number of sure prospects are allowed. On the basis of these axioms the existence of a measurable utility is established.

AD-604 142 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
POLYNOMIAL-LIKE APPROXIMATION,
by Oliver Gross. 5 Sep 52, 7p P-323
Unclassified report

Descriptors: (*Real variables, Functions), (*Functions, Numerical analysis), Polynomials, Functional analysis.

This is a short note on approximate representation for computing purposes of continuous real-valued functions of several real variables by finite sums of functions separable in the individual variables. (Author)

AD-604 145 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.

system in or near a specified state at minimum cost. Another large category of problems, of economic and industrial origin, are those in which it is required to maximize the output of a system given a limited quantity of resources. Only one representative of this category will be discussed in this paper.

AD-604 207 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE STABILITY THEORY OF DIFFERENTIAL-DIFFERENCE EQUATIONS,
by Richard Bellman and John M. Danskin, Jr.
17 Mar 53, 29p P-381
Unclassified report

Descriptors: (*Differential equations, Stability), (*Difference equations, Stability), Linear systems, Nonlinear systems, Automatic, Control systems, Time-lag theory, Mathematical models.

A survey of the stability theory of linear and nonlinear differential-difference equations is given with particular reference to the applications to the problems of automatic control in systems possessing time-lags. (Author)

AD-604 210 Div. 15, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME MATHEMATICAL METHODS AND TECHNIQUES IN ECONOMICS,
by I. N. Herstein. 24 Mar 53, 28p P-385
Unclassified report

Research undertaken under contract between the Cowles Commission for Research in Economics and The Rand Corp.

Descriptors: (*Economics, Mathematics), (*Mathematics, Economics), Mathematical analysis, Game theory, Operators (Mathematics).

The purpose of the paper is to give a presentation of some phases of pure mathematics that are in current use in the economic world.

AD-604 212 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOL. 9,
by Cecil Hastings, Jr. and James P. Wong, Jr.
1 Apr 53, 6p P-387
Unclassified report

Descriptors: (*Numerical analysis, Bessel functions), (*Bessel functions, Numerical analysis), Functions, Numerical methods and procedures.

Analytical approximations of Bessel functions of imaginary argument are presented.

AD-604 214 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOL. 10,
by Cecil Hastings, Jr. and James P. Wong, Jr.
16 Apr 53, 6p P-3987
Unclassified report

Descriptors: (*Numerical analysis, Bessel functions), (*Bessel functions, Numerical analysis), Functions, Numerical methods and procedures.

Analytical approximations of Bessel functions of imaginary argument are presented.

AD-604 216 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE INCOMPLETE APPROXIMATOR (IN SIX FITS),
by Cecil Hastings, Jr. and James P. Wong, Jr.
12 Jun 53, 21p P-404
Unclassified report

Presented to the June 12, 1953 meeting of the Digital Computers Association.

Descriptors: (*Analytic geometry, Graphics), (*Curve fitting, Graphics), (*Graphics, Curve fitting), Numerical analysis, Numerical methods and procedures.

A graphical treatment of curve fitting techniques is presented.

AD-604 217 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE CLASS OF GAMES OVER FUNCTION SPACE AND RELATED VARIATIONAL PROBLEMS,
by W. H. Fleming. 20 May 53, 37p P-405
Unclassified report

Descriptors: (*Game theory, Calculus of variations), (*Calculus of variations, Game theory), Functions, Set theory, Theorems, Optimization, Convex sets.

A certain class of two person zero sum games in which the players have functions as pure strategies is considered. A notion of mixed strategy is defined for such games, and a theorem is proved insuring the existence of solutions in mixed strategies. By specializing to consider games in which one player has a passive role, some apparently new information on the existence of solutions to certain variational problems is obtained. (Author)

AD-604 219 Div. 15, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
BOTTLENECK PROBLEMS AND DYNAMIC PROGRAMMING,
by Richard Bellman. 22 May 53, 9p P-407
Unclassified report

Descriptors: (*Dynamic programming, Theory), (*Industrial production, Dynamic programming), (*Inventory control, Dynamic programming), Differential equations, Partial differential equations, Mathematical models, Economics, Management control systems.

The purpose of the paper is to indicate how the theory of dynamic programming provides a mathematical formulation and a systematic approach to an interesting and significant class of production and allocation problems.

ON STOCHASTIC LEARNING THEORY,
by Merrill M. Flood. 19 Dec 52, 25p P-353
Unclassified report

Descriptors: (*Learning, Stochastic processes), (*Stochastic processes, Learning), Probability.

AD-604 161 Div. 15, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONFLICTS WITH IMPRECISE PAYOFFS,
by J. D. Williams. 15 Dec 52, 15p P-354
Unclassified report

Descriptors: (*Game theory, Economics), (*Economics, Game theory).

The paper is a lecture on game theory delivered at the Symposium on Applications of Game Theory, sponsored by the American Mathematical Society.

AD-604 167 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOLUME 7,
by Cecil Hasting, Jr. and James P. Wong, Jr.
16 Jan 53, 6p P-364
Unclassified report

Descriptors: (*Numerical analysis, Bessel functions), (*Bessel functions, Numerical analysis), Functions, Numerical methods and procedures.

Analytical approximations of Bessel functions of imaginary argument are presented.

AD-604 174 Div. 15
OTS Prices: HC $3.00/MF $0.75

Arcon Corp., Lexington, Mass.
AN INTRODUCTION AND BEGINNER'S GUIDE TO MATRIX PSEUDO-INVERSES,
by Arthur Albert. Jul 64, 73p
Contract Nonr4401 00, Proj. RR003 04 01
Unclassified report

Descriptors: (*Matrix algebra, Transformations (Mathematics)), (*Transformations (Mathematics), Matrix algebra), Projective geometry, Least squares method, Perturbation theory, Equations, Theorems.

This paper presents a tutorial development of the theory of matrix pseudo-inverses, with some applications. The proofs are based on two classical theorems - the diagonalization theorem for symmetric matrices and the projection theorem for finite dimensional vector spaces. With the aid of the pseudo-inverse concept, explicit closed form expressions for such things as the general solution to under specified linear equations, the projection of a vector onto a linear manifold, the solution to least squares problems subject to linear constraints and the Gramm-Schmidt orthogon alization procedure are exhibited. An asymptotic expansion of (A + epsilon B) to the minus 1 power, where A is non-negative definite, B is positive definite and epsilon is small (the classical perturbation problem) which does not require knowledge of the eigenvalues and eigenvectors of A and B is developed. Briefly the definition of the pseudo-inverse evolves as follows: If H is an n x M matrix and Z is an n-vector, there may or may not be an M-vector X, satisfying the equation HX = Z.

AD-604 198 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A BEHAVIORAL MODEL OF RATIONAL CHOICE,
by Herbert A. Simon. 20 Jan 53, 17p P-365
Unclassified report

Descriptors: (*Decision theory, Mathematical models), (*Game theory, Decision making), Behavior, Numerical analysis, Probability, Functions, Bionics.

A model is proposed for the description of rational choice by organisms of limited computational ability. (Author)

AD-604 203 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOLUME 8,
by Cecil Hastings, Jr. and James P. Wong, Jr.
2 Mar 53, 6p P-376
Unclassified report

Descriptors: (*Numerical analysis, Bessel functions), (*Bessel functions, Numerical analysis), Functions, Numerical methods and procedures.

Analytical approximations of Bessel functions of imaginary argument are presented.

AD-604 205 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A DERIVATIVE TEST FOR FINITE SOLUTION OF GAMES,
by I. Glicksberg. 12 Mar 53, 8p P-379
Unclassified report

Descriptors: (*Game theory, Mathematical analysis), Functions, Polynomials, Equations, Theory.

Karlin (AD-603 995) introduced a class of payoff functions M, related to convex payoff functions, for which optimal strategies with at most a finite number of points of increase always exist. The purpose of this paper is to give a proof for all n of the theorem concerning these functions which Karlin proved for n<or=5.

AD-604 206 Div. 15, 30, 32
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON SOME VARIATIONAL PROBLEMS OCCURRING IN THE THEORY OF DYNAMIC PROGRAMMING,
by Richard Bellman, Irving Glicksberh, and Oliver Gross. 1 May 53, 51p P-380
Unclassified report

Descriptors: (*Dynamic programming, Calculus of variations), (*Calculus of variations, Dynamic programming), Operations research, Mathematical models, Differential equations, Control systems, Economics, Functions, Functional analysis, Time-lag theory.

This paper presents some results of an investigation of a class of interesting and important variational problems involving the control of a physical system over a time interval. One large category of problems of this nature arises in connection with the maintenance of a dynamic

(*Functions, Equations), Differential equations, Stochastic processes, Probability, Optimization, Iterative methods, Integral equations.

Various analytic properties of a particular functional equation are studied together with a number of generalizations of discrete and continuous type.

AD-604 238 Div. 15, 33
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMMENTS ON J. VON NEUMANN'S 'THE PROBLEM OF OPTIMAL ASSIGNMENT IN A TWO-PERSON GAME',
by G. B. Dantzig. 21 Jul 52 7p P-435
Unclassified report

Descriptors: (*Game theory, Optimization), Theorems, Permutations, Transportation.

Certain arguments in J. von Neumann's paper reducing the optimal assignment problem to a two-person game can be simplified. A simple observation produces a proof that all vertices of the convex of solutions (or a related continuous problem) are permutations; hence, admissible solutions to the original combinatorial problem. (This is a modification of the author's proof that optimal solution to the transportation problem is integral if the row and column totals are integers.) The present proof depends on a well-known and easily verified theorem that the vertex of a convex defined by m-linear equations in n-non-negative variables (considered as a point in R sub N) has at most m positive components. (Author)

AD-604 239 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE CONTINUOUS GOLD-MINING EQUATION,
by Richard Bellman and Sherman Lehman.
1 Oct 53, 9p P-436
Unclassified report

Prepared in cooperation with Stanford Univ., Calif.

Descriptors: (*Dynamic programming, Equations), (*Game theory, Equations), Differential equations, Calculus of variations.

AD-604 241 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NOTE ON THE NUMERICAL TREATMENT OF SECOND-ORDER DIFFERENTIAL EQUATIONS,
by Richard Latter and Herman Kahn. 7 Oct 53,
5p P-439
Unclassified report

Descriptors: (*Differential equations, Numerical analysis), (*Numerical analysis, Differential equations), Numerical methods and procedures, Transformations (Mathematics), Integral equations, Integration, Power series.

The method is based on converting the differential equation into an integral equation, which is effected by a double integration. Examples of this method are presented.

AD-604 242 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE PRODUCT FORM FOR THE INVERSE IN THE SIMPLEX METHOD,
by George B. Dantzig and William Orchard-Hays.
9 Oct 53, 8p P-440 Unclassified report

Descriptors: (*Iterative methods, Linear programming), (*Linear programming, Iterative methods), Matrix algebra, Numerical methods and procedures, Transformations (Mathematics).

When a matrix is represented as a product of 'elementary' matrices, the matrix, its transpose, its inverse and inverse transpose are readily available for vector multiplication. By an 'elementary matrix' is meant one formed from the identity matrix by replacing one column; thus an elementary matrix can be compactly recorded by the subscript of the altered column and the values of the elements in it. In the revised simplex method both the inverse and inverse transpose of a 'basic' matrix are needed; more significant, however, is the fact that each interation replaces one of the columns of the basis. In the product form of representation, this change can be conveniently effected by multiplying the previous matrix by an elementary matrix; thus, only one additional column of information need be recorded with each iteration. This approach places relatively greater emphasis on 'reading' operations than 'writing' and thereby reduces computation time. Using the I.B.M. Card Programmed Calculator, a novel feature results: when the inverse matrix is needed at one stage and its transpose at another, this is achieved simply by turning over the deck of cards representing the inverse. (Author)

AD-604 243 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS: VOLUME 13,
by Cecil Hastings, Jr. and James P. Wong, Jr.
9 Oct 53, 8p P-441 Unclassified report

Descriptors: (*Numerical analysis, Numerical methods and procedures), Integrals, Trigonometry, Bessel functions, Fluid dynamic properties.

Analytical approximations of a definite integral, Cosine transformation, Bessel function, Mach number and a natural logarithm are presented.

AD-604 251 Div. 15
OTS Prices: HC $1.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
AN INEQUALITY FOR CONVEX FUNCTIONS INVOLVING MAJORIZATION.
Mathematical note,
by Albert W. Marshall and Frank Proschan. Jul 64,
8p D1-82-0360, Boeing-Math-356
Unclassified report.

Also available from the author.

Descriptors: (*Inequalities, Functions), (*Functions, Inequalities), Theorems, Numerical methods and procedures.

A simple inequality involving expectations of convex functions and the notion of majorization is derived. Although the result is easily obtained, it yields as special cases Karamata's Inequality, Muirhead's Theorem, and several new theorems. (Author)

AD-604 257 Div. 15
OTS Prices: HC $2.00/MF $0.50

Wisconsin Univ., Madison

AD-604 221 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INEQUALITIES,
by Richard Bellman. 8 Jun 53, 11p P-412
Unclassified report

Descriptors: (*Inequalities, Theorems), Mathematical logic, Calculus of variations, Algebra, Geometry, Symposia.

A speech prepared for delivery before a Teachers' Conference at UCLA, 8 July 1953, containing an elementary presentation of some fundamental inequalities. (Author)

AD-604 222 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A SIMPLE DERIVATION OF THE POSSION DISTRIBUTION,
by R. E. Kalaba. 11 Jun 53, 3p P-414
Unclassified report

Descriptors: (*Distribution theory, Probability), (*Probability, Distribution theory), Stochastic processes, Mathematical analysis.

One of the most important stochastic processes is the Poisson process, in which it is assumed that (a) the numbers of events occurring in nonoverlapping time intervals are independent; (b) the probability of one event's occurring during time dt is lambda dt + o(dt), where lambda is a constant, while the probability that two or more occur is o(dt). Using only the simplest kind of reasoning from probability theory, the Poisson distribution is deduced from the basic assumptions (a) and (b). Consequently, the need for viewing the Poisson distribution as a limiting case of some other distribution is obviated. In addition the technique used readily generalizes to the case in which lambda depends on t.

AD-604 223 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOL. 11,
by Cecil Hastings, Jr. and James P. Wong, Jr.
1 Jul 53, 6p P-415
Unclassified report

Descriptors: (*Numerical analysis, Bessel functions), (*Bessel functions, Numerical analysis), Functions, Numerical methods and procedures.

Analytical approximations of Bessel functions and of mach numbers in terms of pressure ratio are given.

AD-604 231 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMPUTATIONAL PROBLEMS IN THE THEORY OF DYNAMIC PROGRAMMING,
by Richard Bellman. 6 Aug 53, 27p P-423
Unclassified report

Descriptors: (*Dynamic programming, Theory), (*Functions, Equations), Economics, Sequences, Optimization, Decision theory, Stochastic processes.

A number of representative approximation techniques in the theory of dynamic programming are illustrated in a discussion of a functional equation.

AD-604 232 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
APPROXIMATIONS IN NUMERICAL ANALYSIS: A REPORT ON A STUDY,
by Cecil Hastings, Jr., David K. Hayward, and James P. Wong, Jr. 13 Aug 53, 10p P-424
Unclassified report

Descriptors: (*Numerical analysis, Functions), (*Functions, Numerical analysis), Digital computers, Bessel functions.

The paper is concerned with the problem of choice of parametric form, and determining the coefficients in the parametric form.

AD-604 233 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOL. 12,
by Cecil Hastings, Jr. and James P. Wong, Jr.
18 Aug 53, 6p P-426
Unclassified report

Descriptors: (*Numerical analysis, Numerical methods and procedures), Bessel functions, Fluid dynamic properties, Integrals, Trigonometry.

Analytical approximations of a Bessel function, mach number, integral, and a Cosine transformation are presented.

AD-604 234 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE DISTRIBUTION OF CERTAIN FUNCTIONALS OF MARKOFF PROCESSES,
by D. A. Darling and A. J. F. Siegert.
31 Oct 53, rev. 20 Apr 54, 28p P-429
Unclassified report

Descriptors: (*Statistical processes, Functional analysis), (*Distribution theory, Statistical processes), Integral equations, Differential equations, Integral transforms.

The problem of the distribution of certain functionals of a general n-dimensional Markoff process X(t) is explored. Analytical methods for the study of random variables are developed. A fundamental pair of integral equations whose unique solution is the characteristic function of U(s, t) is also developed.

AD-604 236 Div. 15
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
A FUNCTIONAL EQUATION IN THE THEORY OF DYNAMIC PROGRAMMING AND ITS GENERALIZATIONS,
by Richard Bellman and Sherman Lehman.
9 Sep 53, 73p P-433
Unclassified report

Descriptors: (*Dynamic programming, Theory),

design having a particular moment matrix may be constructed. It is supposed that the investigator is only prepared to carry out experiments in a particular region which he defines by fixing measures of location and spread equal to some fixed values for each variable. An application is described of a method used for the actual construction of a design after the moment matrix has been determined.

AD-604 265 Div. 15, 30
OTS Prices: HC $2.00/MF $0.50

Wisconsin Univ., Madison
THE EXPERIMENTAL STUDY OF PHYSICAL MECHANISMS.
Technical rept. no. 29,
by G. E. P. Box and William G. Hunter. Apr 64, 42p
Grant NSF GP2755
Unclassified report

Descriptors: (*Mathematical models, Statistical analysis), Iterative methods, Least squares method, Data, Design, Engineering, Chemical reactions, Scientific research.

Consideration is given to the problem of improving hypotheses iteratively, special emphasis being given to catalyzing the links between determining that a given model is inadequate, finding out how it is inadequate, and hence constructing a more appropriate model.

AD-604 266 Div. 15
OTS Prices: HC $2.00/MF $0.50

Wisconsin Univ., Madison
BAYESIAN ANALYSIS OF RANDOM-EFFECT MODELS IN THE ANALYSIS OF VARIANCE. I. POSTERIOR DISTRIBUTION OF VARIANCE-COMPONENTS.
Technical rept. no. 30,
by George C. Tiao and W. Y. Tan. May 64, 37p
Contract Nonr1202 17, Proj. NR042 222
Unclassified report

Descriptors: (*Analysis of variance, Mathematical models), (*Distribution theory, Analysis of variance), Numerical analysis, Numerical methods and procedures, Groups (Mathematics), Integral equations, Probability.

AD-604 282 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING AND A NEW FORMALISM IN THE CALCULUS OF VARIATIONS,
by Richard Bellman. 12 Nov 53, 8p P-454
Unclassified report

Descriptors: (*Dynamic programming, Calculus of variations), (*Calculus of variations, Dynamic programming), Stochastic processes, Partial differential equations, Decision theory, Functions, Equations.

The paper, shows that the functional equation technique introduced in previous works may be used to provide a new approach to some classical problems in the calculus of variations. In addition to furnishing a new analytic weapon, the method has great potentialities as a computational tool.

AD-604 283 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME PROBLEMS IN THE THEORY OF DYNAMIC PROGRAMMING,
by Richard Bellman. 2 Nov 53, 21p P-455
Unclassified report

Descriptors: (*Dynamic programming, Theory), Functions, Equations, Sequences, Stochastic processes, Optimization.

The theory of dynamic programming treats problems involving multi-stage processes by means of a transformation of the problem from the space of decisions to the space of functions. This is accomplished by deriving a functional equation whose solution is equivalent to the solution of the original problem. To illustrate this approach most clearly, free of extraneous analytic details, a simple but nontrivial multi-stage investment problem is considered. How exact solutions may be obtained in some cases, approximate solutions in others, and how these approximate solutions may be used to obtain more accurate solutions in the general case is shown. Of particular importance is the decrease in the number of independent variables made possible by this approach. This is not only important from the theoretical standpoint, but is also of great value in reducing the cost in time and effort of numerical computation. (Author)

AD-604 285 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON SOME APPLICATIONS OF THE THEORY OF DYNAMIC PROGRAMMING TO LOGISTICS,
by Richard Bellman. 19 Nov 53, 24p P-457
Unclassified report

Descriptors: (*Dynamic programming, Logistics), (*Logistics, Dynamic programming), Sequences, Probability, Mathematical models, Optimization, Functions, Equations.

In recent years, the study of multi-stage processes has become of greater and greater importance in wider and wider fields. A multi-stage process means a process composed of a sequence of operations in which the outcome of the preceding operations may be used to guide the course of future operations. Two types of operations may be distinguished immediately, those in which the outcome is completely determined, and those in which the outcome is uncertain. To treat these problems in a systematic fashion the theory of dynamic programming has been developed. In the article, some simple, but non-trivial, problems of the kind that plague logisticians are considered in order to illustrate what kinds of problems are amenable to out techniques, what analytic results may be expected, and what computational procedures must be utilized in general. (Author)

AD-604 288 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON PERTURBATION METHODS INVOLVING EXPANSIONS IN TERMS OF A PARAMETER,
by Richard Bellman. 25 Nov 53, 11p P-463
Unclassified report

Descriptors: (*Power series, Numerical methods and procedures), (*Numerical methods and procedures, Power series), Numerical analysis, Equations, Integral equations, Nonlinear differential equations, Functions.

It is shown by means of some examples from the theories of linear algebraic equations, linear integral equations, and nonlinear differential equations that the effectiveness of the method of expanding the solution in

ESTIMATING MISSING VALUES IN UNREPLICATED TWO-LEVEL FACTORIAL AND FRACTIONAL FACTORIAL DESIGNS.
Technical rept. no. 20,
by Norman R. Draper and David M. Stoneman.
Jul 63, 36p
Contract Nonr1202 17, Proj. NR042 222

Unclassified report

Descriptors: (*Combinatorial analysis, Factor analysis), Statistical analysis, Numerical methods and procedures, Matrix algebra, Design.

It has been recommended that for a single performance of a complete factorial design, a missing value be estimated by 'minimizing the sum of squares for the interactions that are used as error'. In the paper, more specific recommendations are made for estimating one or more missing values when the design is a two level factorial or fractional factorial. (Author)

AD-604 259 Div. 15
OTS Prices: HC $2.00/MF $0.50

Wisconsin Univ., Madison
BAYESIAN ANALYSIS OF THE REGRESSION MODEL WITH AUTOCORRELATED ERRORS.
Technical rept. no. 22,
by Arnold Zellner and George C. Tiao. Dec 63, 26p
Grant NSF GS151

Unclassified report

Also issued as Systems Formulation and Methodology Workshop Paper no. 6313.

Descriptors: (*Mathematical models, Statistical analysis), Functional analysis, Statistical functions, Statistical processes, Errors.

Bayesian methods are used to analyze the regression model with errors generated by a first order auto-regressive scheme. For a simple regression model, a derivation is made of finite sample joint, conditional and marginal posterior distributions of the parameters of the model. With these distributions, inferences can be made about parameters and investigations can be made as to how departures from independence, very often encountered in economic data, affect inferences about parameters. Further, this approach provides a unified treatment of non-explosive and explosive models and in fact yields results for deciding whether a process is or is not explosive. To illustrate application of the techniques, two sets of artificially generated data, one set from a non-explosive model and the other from an explosive model, are analyzed in detail. Then, techniques are developed for a Bayesian analysis of the multiple regression model with autocorrelated errors. (Author)

AD-604 260 Div. 15
OTS Prices: HC $1.00/MF $0.50

Wisconsin Univ., Madison
ON THE BAYESIAN ESTIMATION OF MULTIVARIATE REGRESSION.
Technical rept. no. 23,
by George C. Tiao and Arnold Zellner. Dec 63, 17p
Grant NSF GS151; Contract Nonr1202 17,
Proj. NR042 222

Unclassified report

Descriptors: (*Mathematical models, Statistical analysis), (*Statistical analysis, Mathematical models), Analysis of variance, Functional analysis, Statistical functions.

AD-604 261 Div. 15
OTS Prices: HC $1.00/MF $0.50

Wisconsin Univ., Madison
A NOTE ON PARTIAL DUPLICATION OF DESIGNS.
Technical rept. no. 24,
by George E. P. Box. Jan 64, 9p
Contract Nonr1202 17, Proj. NR042 222

Unclassified report

Descriptors: (*Analysis of variance, Factor analysis), Correlation techniques, Numerical analysis, Least squares method, Errors, Design.

The object of the paper is to supply a simple and general procedure for estimating the effects and their variances and covariances for the augmented arrangements resulting from particular schemes of partial duplication.

AD-604 262 Div. 15
OTS Prices: HC $3.00/MF $0.75

Wisconsin Univ., Madison
AN ANALYSIS OF TRANSFORMATIONS.
Technical rept. no. 26,
by G. E. P. Box and D. R. Cox. Mar 64, 67p
Contract Nonr1202 17, Proj. NR042 222

Unclassified report

Descriptors: (*Transformations (Mathematics), Analysis), Analysis of variance, Nonlinear systems, Mathematical models, Experimental data, Statistical analysis, Statistical processes, Numerical methods and procedures.

In the analysis of data it is often assumed that observations y1, y2, . . . , y sub n are independently normally distributed with constant variance and with expectations specified by a model linear in a set of parameters theta. In this paper the less restrictive assumption is made that such a normal, homoscedastic, linear model is appropriate after some suitable transformation has been applied to the y's. Inferences about the transformation and about the parameters of the linear model are made by computing the likelihood function and the relevant posterior distribution. The contributions of normality, homoscedasticity and additivity to the transformation are separated. The relation of the present methods to earlier procedures for finding transformations is discussed. The methods are illustrated with examples. (Author)

AD-604 264 Div. 15
OTS Prices: HC $2.00/MF $0.50

Wisconsin Univ., Madison
NON-SEQUENTIAL DESIGNS FOR THE ESTIMATION OF PARAMETERS IN NON-LINEAR MODELS.
Technical rept. no. 28,
by G. E. P. Box and William G. Hunter. 1964, 30p
Contract Nonr1202 17, Proj. NR042 222

Unclassified report

Descriptors: (*Mathematical models, Analysis of variance), Numerical analysis, Matrix algebra, Equations, Design.

It is supposed that the region in which experiments can be performed is virtually unlimited and no restraints need be applied. For this case designs are derived which give uncorrelated estimates for the parameters with the variances of these estimates proportional to some preselected constants. The optimal design is defined in terms of its moment matrix. It is then shown how a

SOLUTION OF PARABOLIC PARTIAL DIFFERENTIAL EQUATIONS,
by M. L. Juncosa. 1 Feb 54, 18p P-499
Unclassified report

Descriptors: (*Partial differential equations, Diffusion), (*Diffusion, Partial differential equations), Nonlinear differential equations, Difference equations, Inequalities, Errors, Theorems, Numerical analysis.

A proof of convergence of the solution of a partial difference equation to the solution of the classical 'problem of limits' for one-dimensional diffusion with zero boundary conditions. (Author)

AD-604 317 Div. 15, 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOLUTION OF A LARGE SCALE TRAVELING SALESMAN PROBLEM,
by G. Dantzig, R. Fulkerson, and S. Johnson.
12 Apr 54, rev. 8 Jul 54, 35p P-510
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Linear programming, Optimization), (*Matrix algebra, Linear programming), Integral transforms, Mapping (Transformations), Combinatoral analysis, Set theory.

It is shown that a certain tour of 49 cities, one in each of the 48 states and Washington, D. C., has the shortest road distance. (Author)

AD-604 318 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MONOTONE CONVERGENCE IN DYNAMIC PROGRAMMING AND THE CALCULUS OF VARIATIONS,
by Richard Bellman. Rev. 3 Sep 54, 9p P-513
Unclassified report

Descriptors: (*Dynamic programming, Calculus of variations), (*Calculus of variations, Dynamic programming), Functions, Iterative methods, Equations.

In the present paper we show that the method of 'approximation in policy space,' developed in the theory of dynamic programming, yields monotone convergence in the calculus of variations. (Author)

AD-604 319 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOLUME 14,
by Cecil Hastings, Jr. and James P. Wong, Jr.
22 Apr 54, 6p P-515
Unclassified report

Descriptors: (*Numerical analysis, Integrals), (*Integrals, Numerical analysis), Numerical methods and procedures.

Analytical approximations of chi-square integrals are presented.

AD-604 323 Div. 15, 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A REVIEW OF FOURIER ANALYSIS AND AUTOCORRELATION,
by Lewis Larmore. 6 May 54, 31p P-523
Unclassified report

Descriptors: (*Fourier analysis, Reviews), (*Statistical functions, Reviews), Numerical methods and procedures, Acoustics, Electronics, Engineering.

A review of Fourier analysis and autocorrelation applications in the problems of physics and engineering is presented.

terms of a parameter may be greatly increased in many cases by expanding in terms of a suitably chosen function of the parameter. This is particularly true when the physical setting of the equation allows only positive values of the parameter to enter. (Author)

AD-604 289 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE CRANK-NICOLSON PROCEDURE FOR SOLVING PARABOLIC PARTIAL DIFFERENTIAL EQUATIONS,
by M. L. Juncosa and David Young. 13 Sep 54, 29p P-465
Unclassified report

Descriptors: (*Partial differential equations, Numerical analysis), Boundary value problems, Functions, Series, Inequalities, Theorems, Numerical methods and procedures.

Proof of convergence of the Crank-Nicolson procedure, an 'implicit' numerical method for solving parabolic partial differential equations, is given for the case of the classical 'problem of limits' for one-dimensional diffusion with zero boundary conditions. Orders of convergence are also given for different classes of initial functions. Results do not support the validity of socalled 'h2-extrapolation' in some cases. (Author)

AD-604 293 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NOTES ON MATRIX THEORY--IV (AN INEQUALITY DUE TO BERGSTROM),
by Richard Bellman. 21 Dec 53, 5p P-469
Unclassified report

Descriptors: (*Matrix algebra, Inequalities), (*Inequalities, Mathematical analysis).

Two proofs are presented of an inequality due to Bergstrom. (Author)

AD-604 295 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON A NEW ITERATIVE ALGORITHM FOR FINDING THE SOLUTIONS OF GAMES AND LINEAR PROGRAMMING PROBLEMS,
by Richard Bellman. 1 Jun 53, 20p P-473
Unclassified report

Descriptors: (*Iterative methods, Operations research), (*Game theory, Iterative methods), (*Linear programming, Iterative methods), Differential equations, Difference equations, Matrix algebra, Numerical methods and procedures.

The aim is to obtain a procedure which converges more rapidly than either the statistical method of Brown, or the differential equation approach of Brown and von Neumann. A variant of the differential equation approach which converges more rapidly than the original is presented. Carrying this approach to its logical limit a process with an exponential rate of convergence is obtained. The discrete analogue, obtained by replacing the differential equation by a difference equation, furnishes the new iterative algorithm.

AD-604 296 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
EQUILIBRIUM ANALYSIS: THE STABILITY THEORY OF POINCARE-LIAPOUNOFF AND EXTENSIONS,
by Richard Bellman. 13 Jan 54, 11p P-475
Unclassified report

Descriptors: (*Differential equations, Stability), Theory, Oscillation, Nonlinear differential equations, Partial differential equations, Difference equations, Time-lag theory.

This paper appears as an appendix to a chapter in a book by E. F. Beckenbach entitled, 'Mathematics for Engineers.' This appendix sketches briefly some of the most important aspects of a part of the general theory of differential equations, the stability theory of equilibrium states. (Author)

AD-604 300 Div. 15, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
BOTTLENECK PROBLEMS, FUNCTIONAL EQUATIONS AND DYNAMIC PROGRAMMING,
by Richard Bellman. 29 Jan 54, 24p P-483
Unclassified report

Descriptors: (*Industrial production, Dynamic programming), (*Inventory control, Dynamic programming), (*Dynamic programming, Inventory control), Management control systems, Mathematical models, Economics, Functional analysis, Equations.

A 'bottleneck problem' in the sense that the level of economic activity will be determined by the resource in shortest supply is discussed. A typical problem of the bottleneck type involving the auto industry, the steel industry and the tool industry is presented. The problem is formulated mathematically employing a discrete approximation. After a short discussion of the difficulties of this approach, a continuous approximation is advanced. Finally, the functional equation approach is applied to the theory of dynamic programming.

AD-604 305 Div. 15, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE THEORY OF DYNAMIC PROGRAMMING AS APPLIED TO A SMOOTHING PROBLEM,
by R. Bellman, I. Glicksberg, and O. Gross. 16 Feb 54, 11p P-491
Unclassified report

Descriptors: (*Dynamic programming, Theory), (*Industrial production, Dynamic programming), Equations, Functions, Integral equations, Economics, Management control systems.

A problem involved in adjusting production facilities to changes in demand is considered using the theory of dynamic programming.

AD-604 308 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE CONVERGENCE OF A PROCEDURE OF DUFORT AND FRANKEL FOR THE NUMERICAL

Annual progress rept. for 1 Feb 63-31 May 64,
by F. A. Simeone and R. W. Hopkins. 31 May 64, 302p
Contract DA49 193MD2022

Unclassified report

Descriptors: (*Hypotension, Blood volume), (*Blood volume, Hypotension), (*Shock (Pathology), Hemorrhage), (*Hemorrhage, Shock (Pathology)), Laboratory animals, Enzymes, Wounds and injuries, Metabolism, Kidney function tests, Metabolism, Drugs, Antibiotics, Autonomic agents, Blood pressure, Blood circulation, Lymph, Lymphatic system, Hematocrit, Blood plasma.

Clinical case histories of forty patients with shock are presented in the first section of this report. The cases are discussed under the following classifications: (1) Surgical shock, (2)hemorrhagic shock, (3) septic shock, (4) septic shock with hemorrhage, (5) traumatic shock with hemorrhage, and (6) miscellaneous types of shock. In some of the cases trimethaphan and phenoxybenzamine were administered. The effects of these drugs are included in the case histories. The second section summarizes the research on prolonged, induced oligemic hypotension in animals. These summaries include the effects of hemorrhage and prolonged oligemia on (1) blood volume, (2) lymph flow, (3) splanchnic circulation and (4) the effects of intestinal sterilization with antibiotics on survival in hemorrhagic hypotension.

AD-603 675 Div. 16, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A THREE-ORGAN DRUG DISTRIBUTION MODEL INCLUDING THE KIDNEY,
by John A. Jacquez, Bella Kotkin, Irwin Cooper, and June D. Buell. Aug 64, 24p RM-4175-NIH
Grant PHS GM09608 03

Unclassified report

Descriptors: (*Excretion, Drugs), (*Chemotherapy, Excretion), (*Mathematical models, Chemotherapy), (*Programming (Computers), Chemotherapy), Kidneys, Cardiovascular system, Blood circulation, Distribution, Blood volume, Blood plasma, Injections (Medicine), Enzymes, Heart, Veins, Arteries, Biophysics, Digital computers, Programming (Computers), Differential equations, Programming languages.

A mathematical model of drug distribution was designed to investigate the effect of injecting an active chemical agent into the blood stream by studying the time course of the resulting drug concentrations throughout the body. In the initial studies of two-organ being, where both organs were linked in parallel with the circulatory system, one of the organs represented an area of particular interest that was marked for selective localization and the other represented the remainder of the body. A third organ is now included which performs certain functions of the kidney. The effect of excretion on the concentrations of the drug in the body, rather than a detailed model of the kidney itself, is investigated. (Author)

AD-603 701 Div. 16, 29
OTS Prices: HC $2.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
X-20A FULL-PRESSURE SUIT QUANTITATIVE PERFORMANCE,
by J. D. Bowen. May 64, 50p
Proj. 6301, Task 630104
AMRL TDR64 36

Unclassified report

Descriptors: (*Space medicine, Astronauts), (*Pressure suits, Exposure suits), (*Exposure suits, Pressure suits), Motor reactions, Hands, Performance (Human), Space environmental conditions, Spacecraft cabins, Simulation, Physical properties, Acoustic properties, Weight, Vision.

A series of experimental procedures was accomplished to demonstrate and measure the protection X-20A (Dyna-Soar) pilots obtain by wearing their custom fitted pressure garments while exposed to simulated mission conditions. Mission conditions were simulated to the extent possible with available altitude and temperature test facilities. Physical characterics of the garments were determined such as weight, pressure drop with flow, dimensional stability, visual fields, and acoustical attenuation. (Author)

AD-603 705 Div. 16, 28, 29
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
FINGER DEXTERITY OF THE PRESSURE-SUITED SUBJECT,
by Dieter E. Walk. May 64, 16p
Proj. 7184, Task 718408
AMRL TDR64 41

Unclassified report

Descriptors: (*Space medicine, Astronauts), (*Gloves, Pressure suits), (*Motor reactions, Hands), Psychomotor tests, Performance tests.

The study attempts to establish an objective baseline for evaluating the functional mobility of pressure gloves. The Purdue Pegboard Dexterity Test was employed to measure hand dexterity under three conditions: (1) subjects barehanded, but wearing an unpressurized A/P-22S-2 full-pressure suit ensemble; (2) subjects gloved (HAK-3/P-22S-2) and suited, but not pressurized; (3) subjects gloved, suited, and pressurized to 2.5 psi. The Purdue Pegboard Dexterity Test was found to be a delicate indicator of hand dexterity in the test conditions. The test results show a marked reduction in dexterity even with the gloves and suit uninflated, and an additional loss when gloves and suit were inflated. The degree of loss of dexterity is believed to provide an objective measure whereby one operational aspect of pressure gloves may be evaluated. (Author)

AD-603 717 Div. 16, 4
OTS Prices: HC $1.00/MF $0.50

New York Medical Coll., N. Y.
DISTRIBUTION AND COMPOSITION OF SIALIC ACIDS AND GLYCOPROTEINS.
Rept. no. 8 (Summary),
by Ward Pigman, K. Tanaka, and M. Nertolini.
Jul 64, 10p
Grant DA MD49 193 62G50

Unclassified report

Descriptors: (*Mucin, Chemical analysis), (*Glycoproteins, Chemical bonds), Amino acids, Peptides, Glycosides, Molecular structure, Plasma substitutes, Salivary glands, Bovines, Hydroxides, Borohydrides, Distribution.

A direct demonstration was made for the first time that the principal type of linkage between carbohydrate side chains of bovine submaxillary mucin and the main peptide chain are glycosidic linkages between N-acetylgalactosamine and the hydroxyl groups of serine and threonine. Apparently such linkages are widely dis-

16. Medical Sciences

AD-603 561 Div. 16, 20
OTS Prices: HC $4.00/MF $1.00

USAF Radiation Lab., Univ. of Chicago, Ill.
QUARTERLY PROGRESS REPORT NO. 52. [THE EFFECTS OF IONIZING RADIATION AND RADIATION PROTECTIVE AGENTS ON THE BIOCHEMISTRY OF MAMMALIAN TISSUES].
15 Jul 64, 137p
Contract AF41 609 1693, Proj. 7757, Task 775702
Unclassified report

The original document contains color, but distribution copies are available in black-and-white reproduction only.

Descriptors: (*Radiobiology, Tissues (Biology)), (*Tissues (Biology), Radiation effects), (*Radioprotective agents, Biochemistry), X rays, Enzymes, Liver, Thiols, Phosphates, Oxidation, Rats, Steroids, Amines, Radiation injuries, Lethal dosage, Oxygen, Anoxia, Cyclobutanes, Serotonin, Histology, Mice, Shielding, Hematology, Aromatic compounds, Ketones, Gamma rays, Fast neutrons, Life span.

Contents: Influence of X-radiation and various chemical agents on the development of a thiophosphate-oxidizing enzyme system in the livers of male rats; Influence of X-irradiation on steroid-induced increases in the activity of a detoxification enzyme in liver; Studies on the toxicity and mechanism of action of 2-mercaptoethylamine; The influence of various chemical compounds on radiation lethality in mice; Studies on tissue oxygen levels and radioprotection with anoxia and serotonin in mice; Studies on the toxic and radioprotective effects of cyclobutane derivatives; Histopathologic findings in the tissues of mice given daily X-ray exposures with or without liver shielding; Hematological and histopathological findings in the tissues of mice fed diets containing para-aminopropiophonone and the effect of daily X-ray exposure on these findings.

AD-603 562 Div. 16
OTS Prices: HC $1.00/MF $0.50

Washington State Univ., Pullman.
AN INVESTIGATION OF THE MECHANISM OF THE 'CARRY-OVER' PERIOD IN THE PHOTOPERIODIC GONADAL RESPONSE IN BIRDS.
Final scientific rept. for 1 Aug 54-29 Feb 64,
by Donald S. Farner. 7 Jul 64, 11p
Contract Nonr1520 00, Proj. NR301 263
Unclassified report

Descriptors: (*Testes, Birds), (*Photoperiodism, Testes), Stimulation, Males, Growth, Sex glands, Adaptation (Physiology), Hormones, Metabolism, Equations, Bibliographies.

Research on the photoperiodic control of testicular cycles in Zonotrichia leucophrys gambelii showed that when males are subjected to stimulatory daily photoperiods of uniform duration, intensity of light, and quality of light, the rate of testicular growth approximates a logarithmic function of time from resting weight (ca. 1 mg.) to 250 mg. Within this range, growth as a function of time therefore can be represented approximately as: log W(sub t) = log W(sub o) + k(sub p) t in which W(sub o) is the resting testicular weight (in mg.) W(sub t) the weight after t days exposure to a daily stimulatory photoperiod of p hours, and k is the testicular growth-rate constant. In this species it was shown that k is a function of light intensity (I), wave length (lambda), environmental temperature (T), the time (r) elapsed after the end of photorefractoriness, and p. These functions, with the exception of k = f(r), were estimated sufficiently accurately on the basis of laboratory experiments so that the reliability of the experimental results, projected into natural conditions, can be evaluated.

AD-603 576 Div. 16, 28
OTS Prices: HC $1.00/MF $0.50

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
A RE-ANALYSIS OF GSR CONDITIONING,
by David G. McDonald and Laverne C. Johnson.
May 64, 10p
Task MR005 12 2304
NMNRU 64 6
Unclassified report

Descriptors: (*Galvanic skin response, Conditioned reflex), (*Conditioned reflex, Galvanic skin response), Psychophysiology, Sensitivity, Stimulation, Shock therapy, Thresholds (Physiology), Reactions (Psychology), Naval personnel, Correlation techniques, Statistical analysis.

It was suggested that a previous analysis of GSR conditioning failed to establish its major point since it neglected to include a pseudoconditioning control for sensitization effects. In the present paper an experiment is reported in which this control was included, and it was found that there was significant evidence of a conditional anticipatory GSR, which was not due to sensitization effects. (Author)

AD-603 595 Div. 16, 4.
OTS Prices: HC $2.25/MF $1.00

Manga Corp., Anaheim, Calif.
STUDY OF HYDROGEN-FIXING MICROORGANISMS FOR CLOSED REGENERATING BIOSYSTEMS.
Rept. for Sep 62-Dec 63,
by James H. Canfield and Max D. Lechtman.
Jun 64, 143p
Contract AF33 657 9633, Proj. 7164, Task 716405
AMRL TDR64 35
Unclassified report

Descriptors: (*Closed ecological systems, Eubacteriales), (*Biochemistry, Closed ecological systems), (*Life support, Space biology), (*Eubacteriales, Closed ecological systems), Hydrogen, Oxidation, Carbon dioxide, Water, Food, Electrolysis, Proteins, Carbohydrates, Lipids, Salts, Pseudomonadales, Electrochemistry, Microorganisms, Culture media, Biosynthesis, Bacteria, Nutrition, Oxygen.

The feasibility of using hydrogen-oxidizing bacteria in conjunction with electrolysis to regenerate oxygen and foodstuff from carbon dioxide and water was investigated. Results showed that 75 liters of Hydrogenomonas eutropha culture can fix the CO2 and supply oxygen for one man. The cell yield is rich in proteins and deficient in carbohydrates and lipids for direct consumption by man. The feasibility of integrating the culture with the electrolysis was also investigated, with incompatibility of the bacteria with high salt content being the limiting factor. The ability of a hydrogen cathode to supply hydrogen to the culture was shown. (Author)

AD-603 648 Div. 16
OTS Prices: HC $7.00/MF $1.50

Western Reserve Univ., Cleveland, Ohio. School of Medicine.
THE PHYSIOLOGY OF PROLONGED OLIGEMIC HYPOTENSION.

AD-604 070 Div. 16, 28
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME PRACTICAL PROBLEMS OF THE ALERTNESS INDICATOR,
by John L. Kennedy. 29 Feb 52, 10p P-272
Unclassified report

Descriptors: (*Attention, Medical equipment), (*Reflexes, Reaction (Psychology)), Motor reactions, Measurement, Tolerances (Physiology), Sleep, Psychophysiology, Electroencephalography, Electrocardiography, Galvanic skin response, Monitors.

An evaluation was made of automatic devices used for alerting personnel when they are in a dangerous condition of drowsiness or fatigue. The problem of personnel alertness is also dealt with from a practical point of view.

AD-604 134 Div. 16, 15
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN APPLICATION OF MARKOV PROCESSES TO THE STUDY OF THE EPIDEMIOLOGY OF MENTAL DISEASE,
by Andrew W. Marshall and Herbert Goldhamer.
Rev. 21 Sep 54, 52p P-311
Unclassified report

Descriptors: (*Mental disorders, Epidemiology), (*Mathematical models, Statistical processes), Psychoses, Tables, Probability.

In the studies the emphasis is on the applied mathematical statistics and model construction of simple Markov processes. The models are very simple ones and in their present form are intended only to provide rough estimates of certain epidemiological parameters that are not directly observable or that can be secured only by expensive and time-consuming field surveys. (Author)

AD-604 179 Div. 16
OTS Prices: HC $1.00/MF $0.50

New York State Univ., Buffalo
CULTIVATION OF DIPLOID CELL STRAIN WI-38, AND ANTIGENIC CHANGES IN THYROID CELLS.
Semi-annual progress rept.,
by George C. Slagle, Jr. and Eugene Zebovitz.
1 Jul 64, 2p
Contract DA18 064AMC138A
Unclassified report

Descriptors: (*Cells (Biology), Growth), (*Immunology, Cells (Biology)), (*Thyroid gland, Antigen-antibody reactions), Culture media, Freezing, Storage, Injection (Medicine), Laboratory animals, Tissues (Biology), Lungs, Tissue extracts, Radioactive isotopes, Amino acids, Iodides, Blood serum, Nitrogen.

A report on the growth of diploid cell strain WI-38 is presented. Aliquots of cells were injected into rabbits for the purpose of obtaining antisera to the cell antigens at different periods of culture. Attempts were made to culture WI-38 cells in rabbit serum, but without success. Tests are now in progress with serum absorbed with human kidney, lung, liver, spleen sediment and with WI-38 cells. Hog thryoid glands were also treated with trypsin and collagenase and monolayer cultures prepared. Investigations revealed that the ability to take up iodide or to produce thyroglobulin is lost after about 3 days in culture.

AD-604 188 Div. 16
OTS Prices: HC $5.00/MF $1.00

Defense Subsistence and Supply Center, Chicago, Ill.
A STUDY OF CHARACTERISTICS AND METHODS OF DETECTION OF FOOD POISONING MICROORGANISMS WITH PARTICULAR EMPHASIS ON CLOSTRIDIUM PERFRINGENS,
by John E. Despaul. 1963 , 166p
Unclassified report

Descriptors: (*Food poisoning, Microorganisms), (*Clostridium perfringens, Detection), Spores, Biochemistry, Toxicity, Proteins, Enzymes, Bacterial extracts, Amino acids, Growth, Culture media, Purification, Ammonia, Salmonella, Escherichia coli, Biological contamination, Food, Heat tolerance, Staphylococcus, Biological assay, Viability, Tests.

The report is concerned with the development of a rapid biochemical test for the detection of Clostridium perfringens in foods. After investigating the characteristics and heat resistance of a food poisoning strain of C perfringens it was inoculated into many small pieces of raw beef. These were stored at various sub-zero and above-zero temperatures. After suitable time intervals, which extended well beyond a five month period, the survival of this organism at the various temperatures was determined. A total of four weeks time was devoted to laboratory practice with the procedures used in the Food Hygiene Laboratory in London. These procedures, which appear in part 3 of the report, are in constant use in that laboratory for detection of the various food poisoning microorganisms. A score of research centers was visited, mostly in England, for specific information available at these institutions. A synopsis of each of these visits is presented in part 4 of the report. (Author)

AD-604 245 Div. 16
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
EXPERIMENTS ON 'THE CORTICAL CORRELATE OF PATTERN VISION,'
by William H. Emmons, Robert Hennessey, and John L. Kennedy. 3 Nov 53, 15p P-447
Unclassified report

Legibility of document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Cerebral cortex, Vision), (*Vision, Cerebral cortex), (*Electroencephalography, Vision), Brain, Stimulation, Visual perception, Electric currents, Voltage, Illumination, Cornea, Retina, Electrodes, Thresholds (Physiology).

The Kohler-Held experiment on DC potential shifts related to visual stimulation was repeated, using two channels of DC recording. In a preliminary experiment, 11 subjects were given 638 exposures to a moving bar of light. Twenty-three per cent of the trials were successful, i.e., a DC response from an occipital electrode referred to a vertex electrode was observed. When records of 8 of the 11 subjects were scored during nonstimulus periods, 31% successes were observed. It is concluded that the DC responses are not necessarily related to the occurrence of the visual stimulus. A second experiment was conducted on 10 subjects with two channels of DC recording. These results suggest that the source of the DC changes may be the corneo-retinal potential from eye movement or other areas of the brain rather than the occipital areas. It is concluded that the Kohler-Held phenomenon, although it may be recorded from all subjects, is statistically infrequent and the conditions under which it does appear are rather obscure. It is suggested that the name, 'The Cortical Correlate of Pattern Vision,' is premature. (Author)

tributed in glycoproteins, and a direct semi-quantitative method was developed to show the presence of such linkages. Indirect evidence was also obtained that a minor proportion of ester linkages to glutamic and aspartic acids may be present. A third type of linkage is not ruled out. Partial purification of an L-fucosidase from abalone liver was accomplished. At least two types are present, one working on simple L-fucosides and the other on mucin fucoside linkages. (Author)

AD-603 737 Div. 16, 28
OTS Prices: HC $2.00/MF $0.50

Lyons Univ. (France).
NEUROPHYSIOLOGICAL INHIBITORY SYSTEMS ACTIVE DURING SLEEP.
Final technical rept. for Jan 62-Jul 64,
by Michel Jouvet. Jul 64, 28p
Grant AF EOAR62 67
AFOSR 64 1307

Unclassified report

Descriptors: (*Nervous system, Sleep), (*Sleep, Nervous system), (*Electroencephalography, Sleep), Inhibition, Nerve impulses, Cerebral cortex, Muscles, Neuromuscular transmission, Stimulation, Thresholds (Physiology), Metabolism, Drugs, Psychophysiology, Behavior, Shock therapy, Injections (Medicine), Physiology, Bibliographies, France.

It was concluded that slow sleep and paradoxical phases (P.P.) are qualitatively different states of the nervous system, and that sleep cannot be considered as a unique continous state. In fact, both ontogeny and philogeny show that two different states may be differentiated. Among the phasic phenomena occurring during P. P., the ponto-geniculo-visual activity (monophasic spikes occurring alone or in clusters) which accompanies the occurrence of rapid eye movements (REM) was investigated: both phenomena are triggered from the pons and the organization REM in different chronic preparations is described. The importance of a colliculo-mesencephalic region for the occurrence of clusters of REM is emphasized, and the dual role of the cortex (visual facilitatory, frontal inhibitory) has been shown. All these results suggest that some complex mechanism integrates rapid eye movements during sleep. The characteristic EMG activity of the extraocular eye muscles during P.P. is also emphasized. (Author)

AD-603 789 Div. 16
OTS Prices: HC $1.00/MF $0.50

Bionetics Research Labs., Inc., Falls Church, Va.
NEW METHODS DEVELOPMENT FOR IRRITANT SCREENING.
Quarterly progress rept. no. 5, 23 Mar-22 Jun 64,
by E. Ross Hart. 5 Aug 64, 11p
Contract DA18 108AMC119A

Unclassified report

Descriptors: (*Irritating agents, Tissues (Biology)), (*Toxins and antitoxins, Biological assay), Aorta, Intestines, Toxic tolerances, Rabbits, Guinea pigs, Aerosols, Laboratory animals, Histamine.

Rabbit aorta and guinea pig ileum were evaluated to determine their suitability as biological indicators of irritant action. The effects of irritants on incised aortic and ileac tissue indicate that it is not advisable to further consider them as biological indicators. Cats and monkeys are now being evaluated for irritant screening. Too, a study is being made of a crude aerosol exposure technique. (Author)

AD-603 930 Div. 16
OTS Prices: HC $1.00/MF $0.50

Civil Aeromedical Research Inst., Oklahoma City, Okla.
EFFECTS OF SOME TRANQUILIZING, ANALEPTIC AND VASODILATING DRUGS ON PHYSICAL WORK CAPACITY AND ORTHOSTATIC TOLERANCE,
by R. V. Ganslen, B. Balke, F. J. Nagle and E. E. Phillips. Dec 63, 9p
Grant NIH6364
CARI 63 34

Unclassified report

Descriptors: (*Drugs, Performance (Human)), (*Tranquilizers, Tolerances (Physiology)), (*CNS stimulants, Tolerances (Physiology)), (*Vasoactive agents, Tolerances (Physiology)), Dosage, Posture, Attention, Cardiovascular system, Blood pressure, Hypnotics, Sedatives, Reaction (Psychology), Reflexes, Attitudes, Stress (Physiology), Pulse rate, Biochemistry, Aviation safety, Motor vehicle accidents, Purine alkaloids.

The effects of one tranquilizing and two analeptic drugs on the physical working capacity and on cardiovascular responses to postural changes were investigated. A definite increase in work capacity was observed after ingestion of a combined caffeine-metrazol preparation, apparently resulting from an increased capacity for cardiac output and maximum oxygen intake. Recordil, a relatively new Italian drug and a very potent dilator of coronary arteries, also improved work capacity but caused a tendency for orthostatic syncope probably due to its generally vasodilating effects. The blood pressure depression observed with Equanil (from the meprobamate group) during rest, exercise and tilting, especially with larger doses, raises the question about the safety of people engaged in the operation of aircraft or motor vehicles when 'sedated' by this drug. Serious incidents and fatal accidents may be precipitated by the emotional indifference to suddenly arising problems or as a consequency of delayed circulatory responses during flight maneuvers. (Author)

AD-603 932 Div. 16
OTS Prices: HC $1.00/MF $0.50

Indiana Univ., Bloomington.
WORK TOLERANCE: AGE AND ALTITUDE,
by D. B. Dill, S. Robinson, J. L. Newton, and B. Balke. Dec 63, 9p
Contract FA2049
CARI 63 33

Unclassified report

Descriptors: (*Exercise, Tolerances (Physiology)), (*Acclimatization, High altitude), Aging (Physiology), Respiration, Oxygen, Volume, Tables.

The work capacity of nine men was measured on the treadmill and/or on the bicycle ergometer at sea level and high altitude; five of these men were studied at intervals 18 to 33 years apart. The maximum capacity for oxygen intake declined with age, both a high altitude and at sea level. Individual responses varied greatly: the most fit individual, age 54, had about as great an oxygen intake on the ergometer at an altitude of 14,200 feet as had a man one-half his age at sea level. After 5 to 6 weeks of acclimatization a man of 71 attained at the elevation of 12,600 feet a greater oxygen intake per kg and per min than a man of 27. At that altitude the peak oxygen intake on the bicycle ergometer may be only one-half of the sea level value two or three days after arrival; after four to six weeks it may range from as little as two-thirds to as much as five-sixths of the sea level value. This improvement of work capacity was the consequence of acclimatization processes as well as of greater physical activity at altitude and was not restricted to the younger experimental subjects. (Author)

17. Metallurgy

AD-603 522 Div. 17
OTS Prices: HC $1.00/MF $0.50

Midwest Research Inst., Kansas City, Mo.
RESEARCH ON THE MECHANISMS OF FATIGUE IN ULTRA SMALL SPECIMENS.
Quarterly progress rept. no. 2, 1 Dec 63-31 Mar 64, by J. C. Grosskreutz. 31 Mar 64, 25p
Contract AF33 657 10883, Proj. 7353, Task 735301
Unclassified report

Descriptors: (*Aluminum, Crystal lattice defects), (*Crystal lattice defects, Metallic crystals), Fatigue (Mechanics), Hardening, Fracture (Mechanics), Foils, Grain structures (Metallurgy), Microstructure, Electron microscopy, Propagation.

Two phases of the current work are described. The first phase, now completed, is concerned with possible dislocation rearrangement in fatigue-hardened aluminum during preparation of samples for transmission electron microscopy. The second phase deals with a theory of fatigue crack propagation. A method of thinning is described in which a thin (600 A) anodic layer is kept intact on the surface of an Al foil during thinning. Such an arrangement suppresses both the escape of dislocations from the surface and their rearrangement within the foil. When rearrangement does occur, slip traces left at the foil-oxide interface record the manner in which this occurs. It was found that rearrangement in fatigue-hardened polycrystalline aluminum, which contains a well developed cell structure, is confined to about 15 per cent of the cells and consists of dislocation motion from one boundary to another across the cell. No measurements were possible to determine actual dislocation loss during thinning, but it is suggested that a previous measurement by Ham may be in error due to pinning of dislocations in the interior of cells during rearrangement. (Author)

AD-603 542 Div. 17
OTS Prices: HC $3.00/MF $0.75

Solar, San Diego, Calif.
EVALUATION OF RMSP TUNGSTEN SHEET.
Quarterly progress rept. no. 4, 1 Apr-30 Jun 64, by F. St. Germain and M. R. Licciardello.
15 Jul 64, 95p Solar-ER-1399-4
Contract NOw63 0786d, Proj. 3478 62
Unclassified report

Descriptors: (*Tungsten, Sheets), (*Sheets, Tensile properties), Tests, High temperature research, Meters, Welding, Diffusion bonding, Machine shop practice, Processing, Electron beams, Thickness, Ductility, Failure (Mechanics), Chemical analysis.

Tensile tests using radiant heating methods on similar test specimens which were previously evaluated by resistance heating was completed. The determination of the formability behavior of RMSP tungsten sheet using a variety of shop processes was continued. Forming parameters using the various sheet gages were developed for brake forming, joggling, corrugating, dimpling, deep drawing, and roll forming. The weldability of RMSP tungsten sheet was determined by electron beam welding techniques. Tensile tests at elevated temperatures indicate that the strength of EB welded joints are approximately 40 to 50 percent of parent metal properties. Diffusion bonding parameters using an intermediate layer of one mil tantalum foil was established for tungsten sheet. Elevated temperature tensile tests performed on the single lap-shear tensile specimens indicated that the single lap-joint diffusion bonded specimens failed at lower than expected loads due to joint rotation under load.

AD-603 543 Div. 17
OTS Prices: HC $3.00/MF $0.75

Naval Research Lab., Washington, D. C.
MECHANICAL PROPERTIES AND ELECTRICAL RESISTIVITY OF THE HEXAGONAL Ag-Al INTERMETALLIC PHASE.
Interim rept.,
by G. Sandoz. Jul 64, 62p
Proj. RR007 01 46 5411
NRL MR1544
Unclassified report

Descriptors: (*Aluminum alloys, Physical properties), (*Silver alloys, Physical properties, Resistance (Electrical), Tensile properties, Brittleness, Ductility, Hardening, Metallic crystals, Zirconium, Tin, Metallography, Heat treatment, Cooling.

The mechanical properties and electrical resistivity of a number of alloys within the composition range of the Ag-Al hexagonal intermediate phase were determined. All the alloys were extruded to rod, swaged, and finally annealed at either 850, 600, or 400F and quenched. The results show that the binary alloys annealed at 400F are strongest; tensile strengths of about 100,000 psi and yield strengths of about 85,000 psi were obtained. The elongation and reduction in area of the binary alloys remained fairly constant at 12 to 18 percent in all the alloys containing less than about 35 a/o Al. With greater amounts of Al the alloys became less ductile. The Ag-Al zeta-phase alloys were shown to be hardened and strengthened slightly, without loss of ductility, by the addition of small amounts of Sn. The as-cast grain size of Ag-Al zeta-phase alloys was shown to be reduced markedly by a small addition of Zr. (Author)

AD-603 549 Div. 17, 14, 26
OTS Prices: HC $6.00/MF $1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NONFERROUS METALLURGY, 1963, VOL. 6, NO. 2,
29 Jun 64, 283p
FTD MT64 13; TT 64 71183
Unclassified report

Edited machine trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Tsvetnaya Metallurgiya (USSR) 1963, v. 6, no. 2, p. 1-187.

Descriptors: (*Metallurgy, Reports), Mining engineering, Flotation, Niobium, Electrolysis, Ores (Metal sources), Refining (Metallurgy), Nickel, Fatty acids, Copper alloys, Calcium, Magnesium, Bismuth alloys, Lead alloys, Powder metallurgy, Tahtalum, Zirconium compounds, Sulfates, Rhenium, Coatings, Germanium compounds, Sulfides, Solutions, Aluminum alloys, Electrolytes, Titanium alloys, Corrosion inhibition, Heat treatment, Aluminates, Iron alloys, USSR.

Reports of Russian research on nonferrous metallurgy are presented. Topics include: (1) multiface drilling; (2) power engineering by multispeed squirrel-cage motors; (3) high speed flotation; (4) ore classification; (5) flotational properties of columbite; (6) current yield during electrolysis of melted salts; (7) equilibrium of system K20-A1203-H2O; (8) extraction of buttons (regulus) from copper-smelting slag; (9) purification of nickel electrolyte; (10) influence of fatty acids on cathode precipitation of nickel; (11) application of ionites for extraction of non-

AD-604 274 Div. 16
OTS Prices: HC $1.00/MF $0.50

Public Health Service, Washington, D. C. Div. of Health Mobilization.
THE ROLE OF THE DENTIST IN NATIONAL DISASTER,
Jul 64, 21p
Contract OCD OS63 65, Task 2421D

Unclassified report

Prepared in cooperation with the Council on Federal Dental Services of the American Dental Association.

Descriptors: (*Civil defense, Dental personnel), (*Dentistry, Civil defense), (*Dental personnel, Civil defense), Nuclear war casualties, Public health, Training programs, Education, Leadership, Diagnosis, Medical examination, Therapy, Surgery.

There are three basic areas of responsibility in which the dentist can serve most effectively: (a) civic or community; (b) administrative; and (c) professional. These areas can be capably served by the dentist without resort to extra disciplinary training. Extra disciplinary functions that become the responsibility of the dentist can be attained through the institution of training programs under the combined aegis of the medical and dental professions. Only the total health team approach can effectively cope with the problems created by a national disaster. The effective utilization of dental auxiliary personnel; the dental hygienist, dental assistant and dental laboratory technician is recognized as a necessary addition to the total health team. The recommended approach to prepare the dentist and dental auxiliaries for new and expanded functions in providing emergency care in national disaster is through the implementation of disaster preparedness principles into existing dental curriculums. (Author)

AD-604 275 Div. 16
OTS Prices: HC $2.00/MF $0.50

Public Health Service, Washington, D. C. Div. of Health Mobilization.
THE ROLE OF THE PHARMACIST IN NATIONAL DISASTER,
Jul 64, 35p
Contract OCD OS63 65, Task 2421D

Unclassified report

Prepared in cooperation with the American Pharmaceutical Association's Committee on Disaster and National Security.

Descriptors: (*Pharmacology, Civil defense), (*Civil defense, Medical personnel), (*Medical personnel, Civil defense), Education, Training programs, Medical supplies, Drugs, Dosage, Storage, Medical examination, Therapy, Public health, Survival, Communicable diseases, Radiation effects, Decontamination.

The role of the pharmacist in disaster preparedness was recorded, setting forth priorities on pharmacists in different types of practice. Recommendations for implementation of the report include the creation of an awareness of the problems by all pharmacists, the motivation of pharmacists to better equip themselves for assuming responsibilities in disaster programs, and the establishment of suitable educational or training mechanisms to achieve these results. To do this, closer coordination with federal, state, and local governments is urged, more use by pharmacists of the training materials of the medical self-help program, and an evaluation of better utilization of the pharmaceutical resources of the community in shelter programs. Specifically, the Committee recommended: (1) The establishment of joint councils of health professions for disaster preparedness. (2) The development, publication and distribution of a basic orientation manual for pharmacists. (3) The establishment of a pharmacy liaison officer for civil defense.

AD-604 276 Div. 16
OTS Prices: HC $1.00/MF $0.50

Public Health Service, Washington, D. C. Div. of Health Mobilization.
THE ROLE OF THE VETERINARIAN IN NATIONAL DISASTER,
Jul 64, 21p
Contract OCD OS63 65, Task 2421D

Unclassified report

Prepared in cooperation with the Veterinary Public Health Section, Communicable Disease Center, Public Health Service, Atlanta, Ga.

Descriptors: (*Civil defense, Veterinary medicine), (*Veterinary medicine, Civil defense), Medical personnel, Nuclear war casualties, Biological warfare, Biological contamination, Public health, Food dispensing, Animals, Survival, Therapy, Medical examination, Training programs, Education, Radiation effects, Communicable diseases, Diagnosis.

Following a disaster, veterinarians will continue in those activities that relate most directly to human welfare. Public health activities will become more important. A major public health responsibility of veterinarians will be to conserve animal sources of human food to insure a continuing food supply for the surviving population. Veterinarians, when necessary, will assume responsibility for providing medical care to populations located in shelters or in other locations during the immediate post attack period. In the event that numbers of human sick and injured are too great to be cared for by the available physicians, veterinarians will provide care, limited by their individual abilities and the needs of the population. Para-veterinary personnel will continue in many of their usual activities, such as food inspection, while others may be utilized as nurse substitutes, etc. (Author)

The determination of a yield locus for the 3/16-in thick sheet of 4% Al-1/4% O2 alpha-titanium alloy is presented.

AD-603 663 Div. 17
OTS Prices: HC $6.00/MF $1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NONFERROUS METALLURGY, 1963, VOL. 6, NO. 3, 30 Jun 64, 249p
FTD MT64 14; TT 64 71188

Unclassified report

Edited machine trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Tsvetnaya Metallurgiya (USSR) 1963, v. 6, no. 3, p. 3-166. Legibility of this document is in part unsatisfactory; reproduction has been made from best available copy.

Descriptors: (*Metallurgy, Scientific research), Structural geology, Ores (Metal sources), Mining engineering, Horizontal indicators, Drills, Safety, Electron microscopy, Infrared spectroscopy, Calcite, Electrical double layer, Minerals, Aromatic compounds, Reduction (Chemistry), Flotation (Separation), Reaction (Kinetics), Copper, Tin, Thermodynamics, Lead, Silicates, Antimony, Bismuth, Arsenic, Separation, Zinc, Aluminum, Electrolytes, Gold, Ultrasonic radiation, Rare earth compounds, Slags, Vandium, Uranium, Deformation, Diffusion, Silver, Silver alloys, Brittleness, Aluminum alloys, Magnesium alloys, Casting, Pipes, Plating, Mathematical models, Heat transfer, Furnaces, Nickel, Economics.

AD-603 698 Div. 17
OTS Prices: HC $4.00/MF $0.75

ManLabs, Inc., Cambridge, Mass.
THE TENSILE DUCTILITY-TRANSITION IN MOLYBDENUM.
Rept. for 30 Apr 63-30 Apr 64,
by B. S. Lement and K. Kreder. Jul 64, 125p
Contract AF33 657 8424, Proj. 7351, Task 735101
WADD TR61 181 P4

Unclassified report

Descriptors: (*Molybdenum, Fracture (Mechanics)), (*Fracture (Mechanics), Molybdenum), Tensile properties, Transition temperature, Ductility, Recrystallization, Fractography, Strain (Mechanics), Grain structures (Metallurgy), Mathematical analysis, Stresses, Creep, Brittleness, Metallography, Impurities, Sheets.

An investigation was carried out to determine the nature of the tensile ductility transition in recrystallized molybdenum strip of three interstitial contents. For a fine grain size, the tensile ductility transition temperature (T sub d) and the brittleness transition temperature (T sub b) were found to approximately coincide; whereas with increase in grain size T sub d is raised and T sub b is lowered. The occurrence of a minimum in the fracture stress (sigma sub F) at T sub d appears to be associated with the temperature dependence of the necking stress (Sigma sub n). Prestraining above T sub d, was found to result in as much as a 20% increase in (sigma sub F) as determined at temperature below T sub d. In general, the mode of fracture initiation was found to be intergranular at T sub d or below and cleavage above T sub d. For a test temperature above as well as below T sub d, crack initiation appears to be the controlling step in fracture. Considering (sigma sub F) as a flow stress corresponding to the fracture strain (epsilon sub F), the variation of (sigma sub F) with temperature above T sub d was predicted within about 15%. Based on a modification of the Cottrell relation for crack initiation, the increase in (sigma sub F) above T sub d is associated with a decrease in both the flow locking parameter (k sub f) and the effective grain size. (Author)

AD-603 720 Div. 17, 25
OTS Prices: HC $4.00/MF $1.00

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
THE MAGNETIC PROPERTIES OF FCC SINGLE CRYSTAL COBALT FILMS.
Scientific rept. no. 4,
by William D. Doyle. Apr 64, 138p
Contract AF19 628 2415, Proj. 5635, Task 563503
AFCRL 64 420

Unclassified report

Descriptors: (*Cobalt, Single crystals), (*Metal films, Cobalt), Magnetic properties, Crystal growth, Iron alloys, Nickle alloys, Ferromagnetic materials, Crystal structure, Films, Hysteresis, Anisotropy, Torque, Instrumentation, Epitaxial growth, Phase studies, Rotation, Stresses.

The purpose of this thesis was to determine the anisotropy and the magnetization reversal process in face-centered-cubic (fcc) single crystal cobalt films.

AD-603 724 Div. 17, 4
OTS Prices: HC $1.00/MF $0.50

MSA Research Corp., Callery, Pa.
FACTORS AFFECTING THE COMPATIBILITY OF LIQUID CESIUM WITH CONTAINMENT METALS.
Quarterly progress rept. no. 2, Sep-Nov 62,
by F. Tepper, S. J. Rodgers, and J. S. Greer. 13 Dec 62, 18p MSAR-62-160
Contract AF33 657 9168

Unclassified report

Descriptors: (*Cesium, Compatibility), (*Liquid metals, Cesium), (*Corrosion-resistant alloys, Cesium), Oxygen, Nitrogen, Carbon, Zirconium alloys, Chemical analysis, Mercury alloys, Cobalt alloys, Chromium alloys, Tungsten alloys, Potassium, Niobium alloys, Titanium alloys, Molybdenum alloys, Microstructure, Alkali metals, Containers, Corrosion, Nickel alloys, High-temperature research, Surface properties, Physical properties.

The analytical phase of the program has been directed toward establishing techniques for oxygen, nitrogen and carbon in cesium. Since the analytical procedures employed for carbon (10 ppm ± 5 ppm) and nitrogen (2 ppm ± 2 ppm) in sodium were easily adapted to cesium, the bulk of the effort has been on development of an oxygen analytical technique. Results indicate that the standard amalgamation technique gives consistently low results for oxygen in cesium. Of the other two techniques evaluated, the MSAR sodium amalgam and the butyl bromide techniques, the sodium amalgam technique seems to be most reliable. This technique has been applied to potassium on an in-house sponsored effort to verify the method. The mechanisms associated with the attack of structural materials by isothermal liquid cesium are being studied. Capsules of Mo-1/2% Ti have been prepared for study of the solution kinetics of this alloy into liquid cesium at 2500F. Dissimilar metal studies with Haynes-25 and Cb-1% Zr have been initiated. (Author)

AD-603 777 Div. 17
OTS Prices: HC $3.00/MF $0.50

Naval Research Lab., Washington, D. C.
ILLUSTRATED GLOSSARY OF FRACTOGRAPHIC TERMS; SECTION 2: GLIDE PLANE DECOHESION, SERPENTINE GLIDE, RIPPLES, STRETCHING, MICROVOID COALESCENCE.
Interim rept.
by C. D. Beachem and D. A. Meyn. Jun 64, 57p
NRL MR1547

Unclassified report

ferrous metals; (12) joint solubility of calcium and magnesium in melted bismuth lead; (13) vapor pressure of aluminate solutions; (14) thermal decomposition of alunite; (15) pentahalides of tantalum and niobium; (16) purification of zirconium sulfate solutions from iron; (17) rhenium coatings; (18) volatilization of germanium sulfides; (19) purification of silicon tetrachloride and trichlorsilane by rectification; (20) sorption of uranium VI and iron III from sulfate solutions; (21) nonmetallic inclusions in aluminum and its alloys; (22) titanium alloys.

AD-603 551 Div. 17, 22, 26
OTS Prices: HC $1.00/MF $0.50

Army Frankford Arsenal, Philadelphia, Pa.
STRESS CORROSION TESTS OF SOME WROUGHT Mg-Li BASE ALLOYS,
by J. C. Kiszka. Jul 64, 22p
Proj. 59332007
AFA M65 1 1

Unclassified report

Descriptors: (*Magnesium alloys, Corrosion), (*Lithium alloys, Corrosion), (*Corrosion, Stresses), (*Welds, Magnesium alloys), Aluminum alloys, Zinc alloys, Silver alloys, Silicon alloys, Humidity, Air, Environmental tests, Armor plate, Creep, Quenching (Cooling), Tensile properties, Hardness.

Seven experimental wrought Mg-Li base alloys (Mg-14Li with various additions of Al, Zn, Ag, and/or Si) were tested for stress corrosion susceptibility in humid air, following mechanical and thermal processing to approximate conditions in the heat-affected zone of a weld. Stress levels during exposure were uncertain because of creep effects. Rapid cooling from 700F rendered susceptible those alloys containing aluminum, regardless of other alloy content. However, heating for 24 hours at 300F following such rapid cooling restored their resistance to stress Corrosion. Alloys strengthened by additions of zinc, silicon, and/or silver, but with aluminum excluded, did not fail in stress corrosion under the conditions of test used in this study. (Author)

AD-603 555 Div. 17, 4
OTS Prices: HC $2.00/MF $0.50

Lehigh Univ., Bethelem, Pa.
SOME ASPECTS OF HETEROGENEOUS EQUILIBRIA: EQUILIBRIA BETWEEN METAL SOLUTIONS AND OXIDE SOLUTIONS IN ATMOSPHERES OF KNOWN PARTIAL PRESSURE OF OXYGEN,
by W. C. Hahn, Jr. Aug 64, 26p
Contract Nonr3762 00,

Unclassified report

Descriptors: (*Solid solutions, Thermochemistry), (*Thermochemistry, Solid solutions), Phase studies, Manganese, Iron, Cobalt, Nickel, Heat of formation, Oxygen, Vapor pressure.

Consideration is given to the thermodynamics of equilibria involving metal solutions, oxide solutions, and atmospheres of known 02 partial pressures. The standard free energy of formation of the oxides of the metals involved are regarded, in one case, as being markedly different (exemplified by the system Mn-Fe-O at 1400K) and, in the other case, as being nearly the same (exemplified by the system Co-Ni-O at 1700K). Results are presented in the form of ternary phase diagrams.

AD-603 566 Div. 17, 8
OTS Prices: HC $3.00/MF $0.75

Aerojet-General Corp., Azusa, Calif.
MICROWELDS FOR MICROASSEMBLIES.
Final rept. for Jul 63-Apr 64,
by R. E. Weilacker and M. Penberg. Apr 64, 93p
AGC-2861
Contract DA36 039AMC02246E

Unclassified report

Descriptors: (*Welds, Miniature electronic equipment), Copper, Manganese, Nickel, Tensile properties, Resistance (Electrical), Experimental data, Tests, Aging (Materials), Thermal stresses, Welding.

The report covers the results of an experimental welding program in which OFHC copper ribbon was welded to nickel-plated alumina substrates, approximately 0.010-in. thick. Resulting data indicated that these welds met, and in the case of weld density, exceeded the requirements of Technical Requirement SCL-7684. The welded module delivered contained a weldment density of 3700 welds per sq. in., which exceeded the required weld density of 1600 welds per sq. in. stipulated by the Technical Requirement.

AD-603 612 Div. 17
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
MAGNETIC PROPERTIES OF RARE EARTH-IRON ALLOYS.
Master's thesis,
by Gerald L. Mouton. Aug 64, 99p
AFIT GNE/Phys/64 12

Unclassified report

Descriptors: (*Iron alloys, Rare earth elements), (*Rare earth elements, Ferromagnetic materials), (*Ferromagnetic materials, Rare earth elements), Intermetallic compounds, Magnetism, Neodymium, Praseodynium, Cerium, Magnetic fields, Magnetic materials, Laboratory equipment, Transition temperature, Magnetic alloys, Magnetic properties, Nickel.

The first objective of this study was to build and calibrate an apparatus for measuring magnetic properties of small ferromagnetic rod samples. The second was to measure the magnetic properties of five rare earth-iron alloys. Magnetic properties of neodymium-iron, praseodymium iron, and cerium-iron alloys were measured on small rod samples. Constant temperature plots of magnetization versus field (up to 24 kOe) as well as constant field plots of magnetization versus temperature (4.2K to 375K) were obtained for the samples. The apparatus provided an accurate and rapid means of obtaining magnetic data. The magnetization value obtained for a pure nickel sample was within .5% of published data. The 24 kOe field was not sufficient to reach the saturation magnetization of the rare earth alloys. The values of Curie temperature could not be obtained by extrapolating the spontaneous magnetization curve to the temperature axis.

AD-603 637 Div. 17
OTS Prices: HC $1.00/MF $0.50

Metals Processing Lab., Mass. Inst. of Tech., Cambridge.
DEFORMATION PROCESSING OF ANISOTROPIC METALS.
Progress rept. no. 5, 1 Mar-30 Apr 64,
by D. H. Avery and W. A. Backofen. Jul 64, 6p
Contract NOw63 0564d

Unclassified report

Descriptors: (*Titanium alloys, Deformation), (*Plasticity, Titanium alloys), Anisotropy, Strain (Mechanics), Compressive properties.

scribed in which steel balls are allowed to drop onto specimens of lead, steel and aluminum. In each test the velocities of impact and rebound are measured as well as the diameter of the indentation remaining in the metal specimen and the time of contact between specimen and indenter. These experimental results are used in conjunction with the analysis to provide for each metal a dynamic stress-strain curve which is then compared to results of a simple compression test performed under impact conditions. For all metals the best agreement occurs if the simple compression tests are performed at a strain-rate of 1,500 sec(-1). The analysis also provides a model of the indentation process which furnishes quite accurate predictions of the size of the permanent indentation, the time of contact during impact and the coefficient of restitution. (Author)

AD-603 949 Div. 17, 26
OTS Prices: HC $2.00/MF $0.50

Watervliet Arsenal, N. Y.
THE EFFECT OF FERRITE ON THE MECHANICAL PROPERTIES OF A PRECIPITATION HARDENING STAINLESS STEEL.
Technical rept.,
by V. J. Colangelo. May 64, 47p
WVT II6404

Unclassified report

Descriptors: (*Stainless steel, Phase studies), Metallography, Dispersion hardening, Forging, Ductility, Anisotropy, Shock resistance, Chromium alloys, Austenite, Tensile properties, Nickel alloys, Molybdenum alloys, Fracture (Mechanics), Mechanical properties.

The primary object of this study was to determine the effect of ferrite and its orientation upon the mechanical properties of a precipitation hardening stainless steel with particular attention to the short transverse properties. The investigation consisted of four major parts: the preliminary investigation of billet properties; the effect of forging reduction and ferrite content upon mechanical properties; the effect of notch orientation upon impact strength and the relationship of heat composition to ferrite content. Low ductility and impact strength in the short transverse direction were found to be associated with the orientation and shape of the ferrite plates. It was also determined that notch orientation had a direct effect upon the values obtained in impact testing. The overall investigation showed that high ferrite contents in general had a deleterious effect upon mechanical properties and that the ferrite content could be minimized by exercising rigorous control of the heat composition. (Author)

AD-604 052 Div. 17, 26
OTS Prices: HC $3.00/MF $0.75

Douglas Aircraft Co., Inc., Santa Monica, Calif.
THE PROPERTIES OF WELDED 18Ni-7Co-5Mo PLATE,
by Z. P. Saperstein and B. V. Whiteson.
30 Apr 64, 60p SM-45959

Unclassified report

Descriptors: (*Steel, Welds), (*Welds, Metal plates), Welding, Aging (Materials), Fracture (Mechanics), Toughness, Mechanical properties, Nickel alloys, Cobalt alloys, Molybdenum alloys, Titanium alloys, Tensile properties, Microstructure, Fractography, Loading (Mechanics), Welding rods.

An investigation was conducted to determine the fabricability of the 18Ni-7Co-5Mo alloy. Studies related to welding techniques, aging response, fracture toughness metallurgical considerations, and delayed failure susceptibility are presented. Finding indicate that: 'High Energy' inert-gas shielded metal-arc welding (MIG) techniques are completely adequate for the welding of 3/4-inch thick 18Ni-7Co-5Mo plate. Welds containing 1.0% titanium show less sensitivity to wide variations in aging cycle, with respect to standard mechanical properties, then do welds made with the nominal titanium content of the parent plate (0.5%). The fracture toughness of welds is relatively insensitive to variations in welding technique, as well as weldmetal composition, when aged at 900F for 12 hours. The welds have poorer fracture toughness characteristics than the parent plate, and the fracture path appears to be associated with an unidentified phase found in the weld-metal. Welds and parent metal of the 18Ni-7Co-5Mo alloy are exceptionally resistant to delayed failure susceptibility when compared to AISI 4340 steel, at equivalent strength levels.

AD-604 053 Div. 17, 10, 26
OTS Prices: HC $4.00/MF $0.75

Douglas Aircraft Co., Inc., Santa Monica, Calif.
STUDY OF TITANIUM ALLOY TANKAGE AT CRYOGENIC TEMPERATURES,
by W. J. Martin, T Matsuda, and E. F. Kaluza.
12 May 64, 119p SM-43116

Unclassified report

Descriptors: (*Titanium alloys, Cryogenics), (*Tanks (Containers), Titanium alloys), (*Cryogenics, Titanium alloys), Aluminum alloys, Vanadium alloys, Silicon alloys, Welding, Pressure vessels, Propellants, Liquefied gases, Oxygen, Hydrogen, Failure (Mechanics), Sandwich construction, Tests, Mechanical properties, Spacecraft, Low temperature research, Storage.

A reliable design for high performance, light weight tankage for cryogenic liquid propellants, including liquid hydrogen, is a critical requirement in future spacecraft. Accordingly, a project was initiated to develop titanium pressure vessel fabrication and welding methods. Using Ti-6Al-4V and Ti-5Al-2.5Sn alloys and incorporating three weld designs, a total of eight 16-inch diameter pressure vessels were manufactured and burst tested at temperatures between ambient and -423F (-253C). In addition, three 30-inch cylinders of sandwich construction were fabricated and tested under selected thermal gradients. The results showed that resistance or fusion welded Ti-6Al-4V tankage can be manufactured and used at temperatures between ambient temperature and -320F (-196C). Further work is necessary to develop titanium tankage for liquid hydrogen applications. The compressive strengths of sandwich cylinders varied very little within the range of the thermal gradients investigated. Information on the fabrication and testing methods as applied to titanium tankage is presented in this report. The possible causes of premature failure at -423F (-253C) and the subject of 'texture strengthening' are briefly discussed. (Author)

AD-604 054 Div. 17
OTS Prices: HC $1.00/MF $0.50

Douglas Aircraft Co., Inc., Santa Monica, Calif.
EFFECT OF HYDROGEN CONTENT ON THE MECHANICAL PROPERTIES OF Ti6Al-4V BAR AT -423F,
by A. R. Burge and S. M. Weiman. 15 Apr 64,
24p SM-44661

Unclassified report

Descriptors: (*Titanium alloys, Cryogenics), (*Cryogenics, Titanium alloys), Hydrogen, Mechanical properties, Tensile properties, Loading (Mechanics), Forging, Welds, Pressure vessels, Aluminum alloys, Vanadium alloys, Rods, Helium, Spacecraft.

Descriptors: (*Fractography, Dictionaries), (*Fracture (Mechanics), Metallic crystals), (*Creep, Surface properties), Deformation, Surfaces, Alloys, Single crystals, Metallography, Vocabulary, Electron diffraction analysis, Grain structures (Metallurgy).

The various fracture surface features formed by fine-scale plastic flow processes are discussed, and the mechanisms by which they are formed are discussed where they are known. Glide plane decohesion, as it has been used in the literature, is shown to be misleading, and a more descriptive term, 'stretching', is used in its place. The use of 'ductile cleavage' to describe the same process should be discontinued. Several terms have evolved to describe the surfaces created by unknown processes. Glide plane decohesion, serpentine glide, ripples, stretching, and three kinds of microvoid coalescence are shown to be parts of a spectrum of plastic rupture - the one end of the spectrum being slip on one or a few parallel planes to give separation of a large single crystal, and the other end of the spectrum being on too fine a scale for the mechanisms to be studied with present day replicas. (Author)

AD-603 779 Div. 17, 26
OTS Prices: HC $3.00/MF $0.50

Universal-Cyclops Steel Corp., Bridgeville, Pa.
HOT WORKING EVALUATION OF REFRACTORY AND REACTIVE METALS.
Interim rept. no. 4, 1 Apr-30 Jun 64,
by John Bonchak. Jul 64, 55p
Contract AF33-657 11270
ASD TR8 170 IV

Unclassified report

Descriptors: (*Refractory metals, Hot working), (*Hot working, Refractory metals), Niobium, Tantalum, Niobium alloys, Molybdenum alloys, Controlled atmospheres, Impurities, Oxygen, Nitrogen, Argon, Metallography, Chemical analysis, Aging (Materials), Ductility, Rolling (Metallurgy), Failure (Mechanics).

The tendency of refractory and reactive metals to be contaminated in the InFab argon atmosphere was investigated. The results of exposures for various times, temperatures, and argon purity levels were evaluated by microhardness traverses, metallographic examination, chemical analyses and bend tests. With due consideration to extraneous variables and accuracy of the test methods, the results have been appraised. (Author)

AD-603 785 Div. 17, 25
OTS Prices: HC $2.00/MF $0.50

Metallurgical Research Labs., Syracuse Univ., N. Y.
CRACK INITIATION IN METALLIC MATERIALS.
Quarterly progress rept. no. 2,
by V. Weiss, P. Packman, G. Nash, and K. Schroder.
Jul 64, 31p MET-E1160-O76QP2
Contract NOw64 0275d

Unclassified report

Descriptors: (*Stainless steel, Fracture (Mechanics)), (*Lithium compounds, Fluorides), (*Single crystals, Fracture (Mechanics)), Relaxation time, Crystal lattice deffects, Strain (Mechanics), Surface properties, Fatigue (Mechanics), Stresses, Loading (Mechanics), Test equipment, Chromium alloys, Nickel alloys.

The mechanisms of crack initiation in LiF single crystals have been studied in Phase I and a value for Neuber's finite particle size has been determined. A dislocation reaction has been proposed to account for the etch pit patterns observed at the crack tips in the LiF crystals and the strain energy obtained from this model has been compared to the strain energy obtained from continuum elasticity considerations. In Phase II, calibration of the fatigue fixture used in the experimental program has been completed and crack growth studies in fatigue specimens of AISI 301 stainless steel are under way. Studies of the stress variation due to relaxation and change in the load carrying cross sectional area in the specimen caused by the presence of the crack are also in progress. (Author)

AD-603 902 Div. 17, 25
OTS Prices: HC $3.00/MF $0.75

RIAS, Inc., Baltimore, Md.
STUDY OF CESIUM ON REFRACTORY METALS USING FIELD EMISSION MICROSCOPY.
Final rept.
by James L. Gummick. Apr 64, 94p
Contract AF19 628 2831, Proj. 8659, Task 865902
AFCRL 64 328

Unclassified report

Descriptors: (*Refractory metals, Surface properties), (*Cesium, Metal films), (*Metal films, Diffusion), Field emission, Microscopy, Adsorption, Heat of activation, Crystal structure, Chemical reactions, Work functions, Thermionic emmission, Composite materials, Experimental data, Programming (Computers), Cathodes (Electron tubes), Crystal lattices, Sorption.

The document is a study of the cause of the cyclic and spontaneous migrations of cesium on refractory metals. Data supporting the hypothesis that the spontaneous migration is the result of lattice heating by emission of electrons of less than Fermi energy have been obtained. Calculations of the activation energy for cesium migration on a cesium substrate using these data are in agreement with results of other workers. The spontaneous migration was very similar for different emitter types and appeared to be almost the same for all substrates. Variations in rates of migration were dependent upon applied field, but not on environmental pressure or temperature. A mechanism has been proposed for the cyclic migration. The mechanism presupposes a critical temperature above which the lattice is cooled by emission. Oscillation about this temperature, coupled with cesium adsorption and migration, appear to be important. The interpretation agrees with experimental results, since it predicts that the effect will be nearly the same for all refractory metal substrates. (Author)

AD-603 929 Div. 17, 25
OTS Prices: HC $3.00/MF $0.75

Brown Univ., Providence R. I.
THE DYNAMIC STRESS-STRAIN RELATION OF METALS AS DETERMINED FROM IMPACT TESTS WITH A HARD BALL.
Technical rept. no. 37,
by C. H. Mok and J. Duffy. Jun 64, 70p
Contract Nonr562 20, Proj. NR064 424

Unclassified report

Descriptors: (*Lead, Impact shock), (*Steel, Impact shock), (*Aluminum, Impact shock), Stresses, Strain (Mechanics), Deformation, Compressive properties, Test methods, Metals.

An analysis is presented of the impact process occuring when a hard ball strikes the surface of a large metal specimen. It is shown that the results of dynamic indentation tests can be interpreted to provide a measure of the yield stress of the metal over a range of strains taking into account the influence of strain-rate. Experiments are de-

were produced from three-inch diameter ingots and evaluated. The T-222 alloy exhibited a significant improvement in elevated temperature mechanical properties over those of the solid solution alloy T-111 (Ta-8W-2Hf). The improvement in mechanical properties was achieved with little or no loss of fabricability or weldability. The effect of higher tungsten, hafnium, and carbon concentrations on the properties of T-222 were also investigated. Increasing the solute concentration of T-222 from 12 to 14 per cent at a W-Hf ratio of 4:1, with the standard 0.01 per cent carbon content, produced a slight improvement in the elevated temperature mechanical properties without adversely affecting fabricability or weldability. Increasing the carbon content of T-222 from 0.01 to 0.04 per cent did not produce any significant improvement in elevated temperature mechanical properties; however, the weld-bend transition temperature was raised to above room temperature. Substitution of nitrogen for carbon in T-222 resulted in no gross change in mechanical or weld properties. An investigation of the effect of thermal and mechanical treatments demonstrated that T-222 was susceptible to aging response. The phases responsible were extracted and identified as complex carbides. (Author)

AD-604 190 Div. 17
OTS Prices: HC $1.00/MF $0.50

IIT Research Inst., Chicago, Ill.
FIBER-REINFORCED METALS AND ALLOYS.
Bi-monthly progress rept. no. 4, 8 May-8 Jul 64,
by N. M. Parikh and L. E. Murphy. 14 Aug 64, 10p
IITR-B6020-4
Contract NOw64 0066c Unclassified report

Descriptors: (*Composite materials, Fiber metallurgy), (*Reinforcing materials, Fibers), (*Fiber metallurgy, Composite materials), Silver, Steel, Tungsten, Mechanical properties, Fracture (Mechanics), Ductility, Tensile properties, Microstructure, Impregnation, Alloys, Wire, Hot working, Brittleness, Metals, Alloys.

The current investigations indicate that the short, discontinuous aligned fibers in a composite only a fraction of the fiber strength is realized. The concentration of fibers at which point the strength of the composite levels off depends upon the fiber diameter. The ductile-brittle transition found in silver-steel composites were also found in tungsten-silver composites. (Author)

The effect of hydrogen content on the mechanical properties of Ti-6Al-4V bar at -423F was investigated. Smooth and notched tensile strength at hydrogen contents of 20, 100, and 200 ppm were determined. The notched tensile strength was determined at three K sub + levels. The K sub + levels were fixed by varying the root radius of circumferentially notched specimens. The results show a statistically significant interaction between notch sharpness and hydrogen content. A dull notch increased the load carrying capacity of the specimens independent of hydrogen content, whereas the load carrying capacity of sharp notched specimens decreased slightly with increasing hydrogen content. (Author)

AD-604 056 Div. 17
OTS Prices: HC $2.00/MF $0.50

Douglas Aircraft Co., Inc., Santa Monica, Calif.
THE EFFECT OF CRACK SHAPE ON FRACTURE TOUGHNESS.
Interim rept.,
by D. L. Corn and W. V. Mixon. 27 Apr 64, 31p
SM-44671

Unclassified report

Descriptors: (*Maraging steels, Fracture (Mechanics)), (*Fracture (Mechanics), Alloys), Toughness, Steel, Cobalt alloys, Molybdenum alloys, Nickel alloys, Titanium alloys, Aluminum alloys, Vanadium alloys, Silicon alloys, Equations, Functions, Tests.

An investigation was made to determine the effect of crack eccentricity upon fracture toughness. Fracture toughness tests, using partial thickness crack (PTC) coupons, were performed on two heats and three thicknesses of the 18Ni-9Co-5Mo (300 psi) maraging steel. In addition, data on tempered 4340 steel and aged Ti-6Al-6V-2Sn were taken from the literature and analyzed. The results to date indicate: 1. Crack ellipticity need not be considered if the gross fracture strength is represented as a function of crack length. However, crack eccentricity must be considered if gross fracture strength is represented as a function of crack depth or crack area. 2. Irwin's constant, as defined by Irwin's equation, is not a constant when eccentricity is varied, and should not be used to judge fracture toughness unless the eccentricity of the cracks has been kept constant. 3. A new parameter, C, similar to Irwin's constant, is introduced. This, unlike Irwin's constant, is apparently unaffected by crack eccentricity. It is suggested that this new parameter might have a wider application than Irwin's constant. (Author)

AD-604 125 Div. 17, 1, 25
OTS Prices: HC $2.00/MF $0.50

Columbia Univ., New York.
RANDOM FATIGUE FAILURE OF A MULTIPLE LOAD PATH REDUNDANT STRUCTURE.
Rept. for 1 Sep 62-31 Jan 64,
by A. S. Heller, R. A. Heller, and A. M. Freudenthal. 1964, 39p
Contract AF33 616 7042, Proj. 2 8 7351, Task 735106
ML TDR64 160

Unclassified report

Descriptors: (*Aluminum alloys, Failure (*Mechanics)), (*Steel, Failure (*Mechanics)), (*Failure (Mechanics), Airframes), Loading (Mechanics), Mathematical analysis, Structures, Stresses, Structural parts, Fatigue (Mechanics), Safety, Life expectancy, Gust loads, Statistical distributions, Load distribution, Mechanical properties, Probability, Functions, Differential equations.

The object of the investigation is the determination of the fatigue life of a multiple load path redundant structure consisting of geometrically similar members having statistically distributed initial strengths and subjected to randomized fatigue loads derived from an exponentially distributed gust spectrum. A modified linear damage rule and failure condition based on ultimate carrying capacity is being used. The method allows computation of a median 'fail-safe' fatigue life of the structure as well as the consecutive failure of individual members. Three aircraft structural materials, 7075-T6 and 2024-T4 aluminum as well as SAE 4340 steel have been investigated. Fatigue lives shorter than those calculated using the linear damage rule are obtained. (Author)

AD-604 170 Div. 17, 30
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
EFFECT OF ELECTRON BOMBARDMENT HEATING ON SURFACES OF TUNGSTEN,
by H. Doering and P. Shahinian. 22 Jul 64, 18p
Proj. RR007 01 46 5407
NRL 6119

Unclassified report

Descriptors: (*Tungsten, Electron bombardment), (*Electron bombardment, Tungsten), (*Heating, Electron bombardment), Heating, Surface properties, Degradation, Grain boundaries, Grain structure (Metallurgy), Sheets, Forts, Electron beams, Oscillation, Fracture (Mechanics), High-temperature research, Microstructure.

Heating to very high temperatures by electron bombardment often roughens (or damages) metal surfaces. This damage to grain boundaries and grain surfaces is examined in electropolished sheet and foil specimens of tungsten. The effects of heating by stationary and oscillating 10-kv beams are compared with the effects produced by thermal radiation. At moderate temperatures, stationary beams induce grain boundary grooving as does thermal radiation, while oscillating beams produce ripples in the surface. At high temperatures, stationary beams and thermal radiation produce pits, while oscillating beams produce cracks, and tilted and dislodged grains. The more severe effects produced by oscillating beams are shown to be associated with thermal cycling. (Author)

AD-604 173 Div. 17, 26
OTS Prices: HC $4.00/MF $0.75

Astronuclear Lab., Westinghouse Electric Corp., Pittsburgh, Pa.
PILOT PRODUCTION AND EVALUATION OF TANTALUM ALLOY SHEET.
Summary phase rept., part 2, 15 Feb 63-15 Apr 64,
by R. L. Ammon and R. T. Begley. 1 Jul 64, 108p
WANL-PR-M-009
Contract N600 19 59762

Unclassified report

Descriptors: (*Sheets, Tanlalum alloys), (*Tantalum alloys, Sheets), (*Forging, Tantalum alloys), (*Rolling (Metallurgy), Tantalum alloys), Carbon alloys, Hafnium alloys, Tungsten alloys, Mechanical properties, Welding, Heat treatment, Transition temperature, Phase studies, Melting, Metallography, Tensile properties, High temperature research, Microstructure, Aging (Materials), Rupture, Ductility, Stresses, Research program administration, Recrystallization, Welds, Impurities, Nitrogen.

Pilot quantities of T-222 (Ta-9.6W-2.4Hf-0.01C) sheet

explosion damage, Radioactive fallout, Decontamination kits, Health physics instrumentation, Civil defense personnel, Urban areas.

The report contains practical, operational information on the decontamination of radioactive fallout. It discusses the type of surfaces which will be encountered, the methods best suited to their decontamination, and the special considerations required by cold weather. It describes the three basic principles of fallout decontamination; cleaning the surface, removing the surface, and covering the surface. The various methods for achieving decontamination are categorized as wet or dry methods, and are discussed individually in detail. Team make-ups, equipment requirements, and operational procedures are covered. The pages devoted to each method are organized as separate, specialized Decontamination Team operation handbooks. It is written for zone Decontamination leaders and Decontamination Team captains. It will be of value also, however, to Planners and others interested in Radiological Recovery. (Author)

AD-603 671 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE COMMUNIST REACH FOR EMPIRE,
by Bernard Brodie. Jun 64, 20p P-2916
Unclassified report

Descriptors: (*China, Foreign policy), (*Communism, USSR), (*Foreign policy, China), Political science, Military strategy, Philosophy, Attitudes.

AD-603 672 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MORALS AND STRATEGY,
by Bernard Brodie. Jun 64, 14p P-2915
Unclassified report

Descriptors: (Military strategy, National defense), (Strategic warfare, Foreign policy), Religion, Political science, Nuclear weapons, Leadership.

AD-603 673 Div. 18, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RATIONALIZING NATO STRATEGY,
by Malcolm W. Hoag. Jul 64, 28p P-2940
Unclassified report

Descriptors: (*Military strategy, Theory), (*Cold war, Political science), Foreign policy, Nuclear warfare, Deterrence, Control, Strategic warfare, Probability.

AD-603 721 Div. 18, 28, 30
OTS Prices: HC $2.00/MF $0.50

Special Operations Research Office, American Univ., Washington, D. C.
A SYSTEM APPROACH TO PERSUASIVE COMMUNICATIONS.
Research memo.,
by William S. Barker. May 64, 29p SORO-RM-64 8
Unclassified report

Report on Task Extend.

Descriptors: (*Operations research, Propaganda), (*Propaganda, Communication theory), (*Psychological warfare, Operations research), Systems engineering, Performance (Human), Motivation, Behavior, Decision making, Feedback, Social communication, Army research, Psychometrics, Theory, Military psychology.

An introduction to one methodological approach potentially useful for research on persuasive communications is given. The paper presents concepts relevant to one of the most pervasive and difficult problems in persuasive communications: namely, the criterion or effects problem. A method of classifying communications content based on a conceptual analysis of effects is suggested -- a schema which may be useful even if communications effects cannot be assessed by the criterion measures described. The paper first deals with a means of developing persuasive appeals that might be used by applied scientists of an engineering bent. This is followed by a discussion of a pragmatic theory of communication recently introduced by Russell L. Ackoff which presents human communication as a purposive activity that can be measured in terms of the decision problems of the recipient. Specific measures developed by Ackoff are described along with references to sources which present their derivation and development. Finally, directions for possible future research are discussed.

AD-603 879 Div. 18, 28, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TOTALITARIAN COMMUNICATIONS AS A MEANS OF CONTROL. A NOTE ON THE SOCIOLOGY OF PROPAGANDA,
by Paul Kecskemeti. 4 May 50, 13p P-150
Unclassified report

Descriptors: (*Propaganda, Social communication), (*Public opinion, Control), Sociology, Political science, Attitudes, Foreign government, Leadership, Group dynamics, Reasoning, Social psychology.

Although a public opinion as we understand it cannot exist in totalitarian states, its place is taken by an official image of the world expressed through the media of mass communications. The individual may not accept this image as true, and indeed often tries to look beyond it, since he sees it as an effort of the bureaucracy to control him. Nevertheless, he usually is forced to accept it, partly for want of something better and partly because of the power he knows stands behind it. For in the totalitarian state both safety and advancement depend upon conformity, and the mass media provide the model with which to conform. (Author)

AD-603 909 Div. 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PSYCHOLOGICAL WARFARE RECONSIDERED,
by Hans Speier. 5 Feb 51, 39p P-196
Unclassified report

Descriptors: (*Psychological warfare, Political science), (*Foreign policy, Psychological warfare), Cold war, Propaganda, Enemy personnel, Military psychology, Military intelligence, Military personne, Countermeasures, Civilian personnel, Government (Foreign), Armed forces operations, Decision making, Leadership.

The concept of psychological warfare is discussed in terms of its cause and effect upon military and civilian personnel. Aspects considered include the weakening of the will to resist, political ideologies, propaganda, deviant political behavior, policy making, and deception techniques.

18. Military Sciences and Operations

AD-603 587 Div. 18, 5, 8, 30
OTS Prices: HC $2.00/MF $0.50

International Electric Corp., Paramus, N. J.
TEST REPORT FOR MAINTAINABILITY AND MAN-MACHINE INTERFACE DEMONSTRATION PLAN.
8 Jul 64, 48p IEC TR 20215.
Contract AF19 626 8
ESD TDR64 404

Unclassified report

Descriptors: (*Strategic Air Command, Command and control systems), (*Command and control systems, Strategic Air Command), (*Maintainability, Command and control systems), Data storage systems, Data transmission systems, Computer personnel, Data processing equipment, Maintenance personnel, Computers, Printed circuits, Maintenance equipment, Control systems, Display systems, Electronic equipment, Ground support equipment, Combat information, centers, Performance (Engineering), Air Force, Communication systems, Test sets.

The report documents the demonstrations held to illustrate the adequacy of RCC, EDLCC/EDTCC, and DDC facilities together with the compatibility of the equipment, maintenance procedures, and personnel. The demonstrations successfully illustrated, within the limits of the products and processes demonstrated, the compatibility of the equipment, maintenance procedures, and personnel as well as the adequacy of facilities for the RCC, EDTCC, EDLCC, and DCC with the following exceptions: a. RCC - The D-29 Test Set broke down and its self-check procedures were insufficient. b. EDLCC - The preliminary T.O.s for the D-29 Test Set were inadequate and there were not enough patchboards for all the drawers and self-check of the D-29 Test Set. c. DDC - There were unsatisfactory results when the use of the oscilloscope or the B-1 Test Set were required. The corrective maintenance procedures in the Preliminary Technical Orders for the DDC Request Translator and Converter/Distributor did not contain information on the use of the B-1 Test Set. Problem Analysis Reports were issued to report unsatisfactory situations and make corrective recommendations. (Author)

AD-603 640 Div. 18, 13, 16, 20
OTS Prices: HC $3.00/MF $0.75

Curtiss-Wright Corp., Caldwell, N. J.
A PROTOTYPE MANUAL FOR PLANNING, ANALYZING AND SCHEDULING FOR RADIOLOGICAL EXPOSURE,
by Mario V. Cammarano. May 64, 66p
Contract OCD OS62 279, Task 3236A

Unclassified report

Descriptors: (*Nuclear particles, Distribution), (*Radioactive fallout, Decontamination), (*Civil defense systems, Urban areas), Nuclear explosions, Radiation effects, Health physics, Radiation tolerance, Radiological dosage, Dose rate, Dosimeters, Radiation damage, Shelters, Instruction manuals, Scheduling.

The report elucidates a planning strategy designed for use during the post-attack phase of a nuclear attack. The report also presents the planning assumptions and techniques specifically expressed in the Second Edition of 'A Prototype Civil Defense Manual for Radiological Decontamination of Municipalities'. Included is a description of the post-attack picture, and a discussion of the characteristics of the radiation field with respect to time after detonation and distance from ground zero. The mathematical basis for, and operation of a Dose Accumulation Analyzer, are presented. The Analyzer is designed to yield fast, accurate information on the probable dose accumulation in personnel resulting from any desired exposure schedule. Data concerning area entry time, minimum shelter stay time, optimum starting times for work crews, optimum evacuation time, and decontamination feasibility, for any combination of Standard Dose Rate and Residual Number, Effective Fallout Arrival Time, and any Allowed Dose criterion can be obtained from the Analyzer. (Author)

AD-603 641 Div. 18, 13, 16, 20.
OTS Prices: HC $7.00/MF $1.50

Curtiss-Wright Corp., Caldwell, N. J.
A PROTOTYPE CIVIL DEFENSE MANUAL FOR RADIOLOGICAL DECONTAMINATION OF MUNICIPALITIES. VOLUME I. DECONTAMINATION PLANNING.
2d ed.,
by Mario V. Cammarano and C. Herbert Wheeler, Jr.
May 64, 321p
Contract OCD OS62 279, Task 3236A

Unclassified report

Descriptors: (*Civil defense systems, Radiological warfare), (*Radiological contamination, Civil defense systems), (*Decontamination, Radiological contamination), (*Health physics, Instruction manuals), Nuclear explosion damage, Radioactive fallout, Radiobiology, Radiological dosage, Health physics instrumentation, Civil defense personnel, Urban planning, Urban areas.

The purpose of Volume I is to furnish information and planning techniques which will enable Civil Defense Planners to formulate and implement plans of action for Operational Recovery from nuclear attack in areas subject to radioactive fallout. A post-attack scenario is presented to acquaint the reader with the conditions in various areas surrounding and downwind from a nuclear detonation. The physical phenomena associated with nuclear detonation and the biological effects of the associated radioactive fallout are described. The principles of planning radiological decontamination are discussed and a concept of sub-dividing large municipalities into smaller, operational units is presented. The concepts of 'Decontaminated Areas' and 'Access Routes' are developed and guidelines for their selection and decontamination are given. The development of Municipal and Zone decontamination plans are discussed, including their conceptual organization and detailed planning guidelines. Simplified analytical procedures based upon the Dose Accumulation Analyzer developed by the authors are presented. Numerous examples and worksheets designed to guide the Analytical Planner are included. Both pre-attack and post-attack analytical planning procedures are discussed. The efficiencies of decontamination methods and equipment are evaluated in terms of human effort and fuel and water requirements.

AD-603 642 Div. 18, 13, 16, 20
OTS Prices: HC $5.00/MF $1.00

Curtiss-Wright Corp., Caldwell, N. J.
A PROTOTYPE CIVIL DEFENSE MANUAL FOR RADIOLOGICAL DECONTAMINATION OF MUNICIPALITIES, VOLUME II. DECONTAMINATION OPERATIONS.
2d ed.,
by Mario V. Cammarano, C. Herbert Wheeler, Jr., and G. Sherman Wing. May 64, 184p
Contract OCD OS62 279, Task 3236A

Unclassified report

Descriptors: (*Health physics, Instruction manuals), (*Civil defense systems, Radiological warfare), (*Decontamination, Radiological contamination), Nuclear

AD-604 201 Div. 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MILITARY DEMONSTRATION AND DISCLOSURE OF NEW WEAPONS,
by Bernard Brodie. 21 Jul 50, 26p P-372
Unclassified report

Descriptors: (*Military strategy, Weapons), (*Weapons, Military strategy), Propaganda.

The paper is concerned with the continuous conflict, which occasionally poses a specific problem of decision, between the legitimate ends of security in military technology and of disclosure for the sake of demonstration potential. The needs of security may conflict with many other desirable ends as well (e. g., accelerating the rate of scientific progress), but such considerations are ruled out of the present discussion except in so far as they may be supplementary to the considerations governing the decision to disclose for the sake of demonstration value, or to refrain from so doing.

AD-604 240 Div. 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE VULNERABILITY OF THE UNITED STATES TO ENEMY ATTACK: ELEMENTS OF AN UNCLASSIFIED RESEARCH PROGRAM IN THE SOCIAL SCIENCES,
by Carl Kaysen. 4 Oct 53, 24p P-438
Unclassified report

Descriptors: (*Nuclear warfare, United States), (*Vulnerability, United States), Aerial warfare, Nuclear bombs, Targets, Military tactics, Defense systems, Detection, Passive defense, Military intelligence, Strategic warfare, Political science, Economics.

The paper is concerned chiefly with attacks from the air using nuclear weapons--A and H bombs. Two questions are discussed: (1) What methods are available for estimating the effects of attacks--in economic, political, and broad social terms? (2) What measures can be taken to reduce these effects, and at what costs?

AD-604 244 Div. 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MILITARY IMPLICATIONS OF NUCLEAR WEAPON DEVELOPMENTS,
by Bernard Brodie. Rev. 30 Oct 53, 21p P-444
Unclassified report

Descriptors: (*Nuclear warfare, Political science), (*Military strategy, Nuclear weapons), Deterrence, Military intelligence, Military psychology, Theory.

AD-604 272 Div. 18, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOVIET STRATEGIC DEBATE: AN IMPORTANT RECENT ADDENDUM,
by Roman Kolkowicz. Jul 64, 39p P-2936
Unclassified report

Descriptors: (*Attitudes, USSR), (*Military strategy, USSR), (*Warfare, Military strategy), Military tactics, Armed forces operations, Weapons, Armament, Foreign policy, Military training, Guided missiles, Nuclear warfare, Communists, Political science.

AD-604 306 Div. 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ATOMIC WEAPONS AND GROUND COMBAT: SEARCH FOR ORGANIZATION AND DOCTRINE,
by H. A. DeWeerd. 12 Mar 54, 15p P-497
Unclassified report

Descriptors: (*Nuclear warfare, Military strategy), (*Army operations, Weapon systems), Military tactics, Military equipment, History, Armament, Defense systems, Foreign policy, Theory, Effectiveness.

Ground combat preparations are discussed in terms of their effectiveness in atomic warfare.

AD-604 320 Div. 18, 20, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMPENSATION FOR WAR DAMAGE: AN ECONOMIC VIEW,
by Jack Hirshleifer. 29 Apr 54, 27p P-517
Unclassified report

Descriptors: (*Passive defense, Economics), (*Nuclear explosion damage, Replacement theory), Nuclear warfare, Vulnerability, Costs, Federal budgets, Site selection, Social sciences, Defense systems, Countermeasures, National defense, Decision making, Urban areas, Nuclear weapons, Aerial warfare.

The object of the paper is to point out that a properly-conceived insurance plan will yield an important social gain by tending to encourage private actions in peacetime having the effect of reducing our national vulnerability to bombing; conversely, a poorly-conceived plan will tend to discourage expenditures designed to reduce vulnerability.

AD-604 321 Div. 18, 20, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
WAR DAMAGE INSURANCE,
by Jack Hirshleifer. May 53, 22p P-519
Unclassified report

Descriptors: (*Passive defense, Economics), (*Nuclear warfare, Passive defense), (*Nuclear explosion damage, Nuclear weapons), Defense systems, Vulnerability, Costs, Countermeasures, Federal budgets, Strategic weapons, Site selection, Urban areas, Targets.

The paper presents the contention that at least a partial way out of the present impasse on the question of passive defense would be to offer war damage insurance to protect property-owners from the chance distribution of losses due to enemy action. It is shown that an appropriate method of insuring property against war damage can be expected, over a period of years, to encourage purely private actions which will, aside from any governmental measures, tend to reduce the physical and economic vulnerability of our cities and industry to enemy bombing.

AD-604 322 Div. 18, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
U. S. REACTION TO NORTH KOREAN AGGRESSION,
by Alexander L. George. 17 May 54, 47p P-522
Unclassified report

AD-603 921 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
EFFICIENCY ASPECTS OF DISPERSAL OF POPULATION AND INDUSTRY,
by Tjalling C. Koopmans. May 51, 15p P-215
Unclassified report

Descriptors: (*Industries, Distribution (Economics)), (*Population, Distribution (Economics)), Damage control, Defense systems, Military strategy.

The paper discusses the dispersal of population and industries in terms of efficiency as a preparedness or war effort.

AD-603 923 Div. 18, 8, 28, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
METHODOLOGY FOR COMMUNICATIONS RESEARCH,
by A. L. George. 18 Jun 51, rev. 31 Aug 51, 9p, P-217
Unclassified report

Descriptors: (*Propaganda, Communication theory), (*Communication theory, Propaganda), Behavior, Reasoning, Analysis, Psychological warfare.

In existing literature on content analysis most discussions of methodology have been focused on problems of content description with content analysis itself usually defined in terms of content description. In many types of communications research, however, content is described in order to make inferences about its conditions or its effects. This paper is concerned with the methodological problems encountered when inferences are made from content about the antecedent conditions of that content. The questions, what procedures can one most fruitfully follow in attempting to draw inferences about conditions and how can these inferences be supported or justified, are examined.

AD-603 969 Div. 18, 5, 28
OTS Prices: HC $3.00/MF $0.50

Aircraft Armaments, Inc., Cockeysville, Md.
ORGANIZATIONAL MODELS FOR COMMAND POST INFORMATION SYSTEMS.
Final rept.
Jun 64, 55p ER-3547
Contract AF19 628 2960, Proj. 2801
ESD TDR64 438
Unclassified report

Descriptors: (*Command and control systems, Models (Simulations)), (*Communication systems, Command and Control systems), Design, Military organizations, Air Force operations, Analysis, Decision making, Behavior, Data processing systems, Military requirements.

This report attempts to clarify issues concerning the organization and functions of command post information systems (CPIS). The purpose of the report is to provide system designers with a better understanding of factors which influence the operation of a CPIS and which constrain system design alternatives. A CPIS is viewed as one of four systems making up a command post -- the others being a command system, a weapon system, and a support system. The Air Force organization is discussed in the light of this concept, with special emphasis being placed on the relationship of the Air Force to the Unified Commands and the L systems. The insights gained from this analysis are incorporated into a conceptual model. This model provides the system designer with a conceptual framework for designing an integrated CPIS. An evaluation model, permitting the system designer to test certain design alternatives has been suggested as an extension of the conceptual model. It is felt that application of these models by a system designer will greatly facilitate the design of a CPIS. (Author)

AD-603 973 Div. 18, 22, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A REVIEW OF THE WEAPONS ACQUISITION PROCESS: ECONOMIC INCENTIVES,
by Robert E. Bickner. Aug 64, 4p P-2925
Unclassified report

Descriptors: (*Government procurement, Weapons), (*Weapons, Government procurement), Costs, Industrial production, Quality control, Aircraft industry, Armed forces supplies, Reviews, Economics.

The problem of the efficiency of our weapons acquisition process, as described by Scherer, is discussed in the review.

AD-603 979 Div. 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME OBSERVATIONS ON THE ROLE OF RESEARCH IN POLITICAL WARFARE,
by W. Phillips Davison. Rev. 1 Oct 51, 31p P-226
Unclassified report

Descriptors: (*Psychological warfare, Theory), (*Political science, Psychological warfare), Cold war, Propaganda, Enemy personnel, Weapons, Foreign policy, Emotions, Attitudes, Behavior, Military intelligence, Warfare, Arms control, History, Economics, Social sciences, Social communication.

The theory of political warfare is discussed in terms of national behavior, politically relevant trends, policy-making, propaganda and psychological warfare techniques.

AD-604 080 Div. 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN EXAMPLE IN THE THEORY OF ORGANIZATION,
by Allen Newell. 14 Feb 51, 3p P-291
Unclassified report

Descriptors: (*Game theory, Logistics), (*Logistics, Game theory), (*Military organizations, Game theory), Conferences, Military strategy, Military organizations, Communication systems.

AD-604 128 Div. 18, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ARE WE SURE ABOUT DISPERSAL?,
by Gershon Cooper and Ronald N. McKean.
19 May 52, 30p P-301
Unclassified report

Descriptors: (*Civil defense systems, Nuclear warfare), (*Nuclear warfare, Civil defense systems), Economics, United States, Vulnerability.

The paper questions dispersal as a sound means of prevention and defense against war.

19. Navigation

AD-603 764 Div. 19, 8
OTS Prices: HC $7.00/MF $1.75

Pickard and Burns Electronics Div., Gorham Corp., Waltham, Mass.
OMEGA. A WORLD-WIDE NAVIGATIONAL SYSTEM. SYSTEM SPECIFICATION AND IMPLEMENTATION,
by J. A. Pierce, W. Palmer, A. D. Watt, and R. H. Woodward. 1 June 64, 354p P and B-886
Contracts Nonr 1866 07, Nonr4173 00

Unclassified report

Descriptors: (*Hyperbolic navigation, Radio navigation), (*Radio navigation, Hyperbolic navigation), Very low frequency, Radio signals, Radio transmitters, Propagation, Systems engineering, Synchronization (Electronics), Radio receivers, Analog systems, Digital systems, Navigation charts, Position finding, Navigation.

This report presents a design plan for a radio-locating facility providing world-wide position fixing of moderate (one-mile) accuracy by phase comparison of VLF (10 - 14 kc) continuous wave radio signals from only eight strategically located transmitting stations usable by aircraft, ships, and land vehicles, and by submarines at moderate (40 - 50 feet) antenna depths.

AD-603 844 Div. 19, 12, 22
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THEORY OF BLIND NAVIGATION BY DYNAMICAL MEASUREMENTS,
by J. J. Gilvarry, S. H. Browne, and I. K. Williams.
29 Dec 49, 33p P-121

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Inertial navigation, Dynamics), Force (Mechanics), Acceleration, Measurement, Gyroscopes, Accelerometers, Spacecraft, Rockets, Trajectories, Differential equations, Position finding, Navigation.

This paper discusses the theory of blind navigation by means of dynamical measurements (measurements of forces or accelerations) made on a proof body in a reference frame internal to a vehicle. Instrumentally, such measurements are made by an accelerometer in a reference frame provided by gyroscopic or other means. The differential equation is considered which determines the position of a vehicle from dynamical measurements of the non-gravitational acceleration b made internally. Three linear approximations to the gravitational field g(r) of the earth, which lead to explicit solutions of this equation, are considered and their limitations are discussed. An interval-wise solution (linear continuation) for trajectories of extended range is described, which is based on such linear approximations and has definite advantages in this application. The theory is applied to the trajectory of the German A10 vehicle.

AD-603 864 Div. 19, 1, 33
OTS Prices: HC $3.00/MF $0.75

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF GENERAL AVIATION TRANSPONDERS. Final rept.
by Robert W. Delaney. Jun 64, 95p
Proj. 108 030 01V
FAA RD 64 90

Unclassified report

Descriptors: (*Aircraft equipment, Transponders), (*Transponders, Airborne), (*Air traffic control systems, Radar beacons), Flight testing, Specifications, Radar equipment, Reliability (Electronics), Coding, Radio navigation, Aircraft antenna, Height finding, Performance (Engineering), Transmitter-receivers, Pilots, Life expectancy.

Operational performance tests were conducted with General Aviation Transponders (GAT), developed under Federal Aviation Agency contracts. Four each of the prototype transponders were furnished and installed by FAA for operation in various aircraft. Questionnaires completed by the pilots of these aircraft provided data for estimating the performance and utility of the GAT along with benefits which might be derived from widespread implementation. It was concluded that while both types of General Aviation Transponders met the contract specifications, design changes are required to correct performance deterioration during operational use. It was also concluded that acceptance and utilization of the GAT by the General Aviation Community depend upon the extent to which its purchase price can be reduced and the equipment operational life increased. It was recommended that the FAA continue to foster introduction of transponders to general aviation by familiarizing the General Aviation Community with the ATCRBS, by investigation of design changes which will improve the GAT. (Author)

AD-603 895 Div. 19, 12
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
LUNAR PARALLAX METHOD OF ASTRO NAVIGATION,
by J. S. Thompson. 12 Dec 50, 14p P-181

Unclassified report

Descriptors: (*Celestial navigation, Astrophysics), (*Celestial guidance, Guided missiles (Surface-to-Surface)), (*Guided missiles (Surface-to-Surface), Celestial guidance), Moon, Stars, Position finding, Optical equipment, Feasibility studies.

In considering the problem of the automatic navigation of long-range surface-to-surface missiles it soon becomes evident that the system must be 'unjammable' by the enemy. That is to say, the missile cannot be required to depend on information received on radio channels (of any frequency) to keep on course. Such methods can be easily confused by the enemy's broadcasting spurious signals. A system not subject to such maltreatment that would measure the change in the position of the moon relative to the stars due to the motion of the observer (the missile, in this instance) over the surface of the earth is proposed. The elements which such a system could have are described.

AD-603 956 Div. 19, 12
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
UNCERTAINTY IN THE ESTIMATE OF POSITION AND VELOCITY ALONG A LUNAR TRAJECTORY USING INDIVIDUAL EARTH-MOON ANGULAR MEASUREMENTS IN A RECURSIVE NAVIGATION THEORY.
Master's thesis,
by Paul J. Ellmer and Donald R. Hefty. Jun 64, 72p
AFIT GGC/EE/64 9

Unclassified report

Descriptors: (*Military strategy, North Korea), (*Foreign policy, Limited war), Communists, Leadership, United States government, Newspapers, History, Military government, Decision-making, USSR, Far Eas

An attempt is made to reconstruct from contemporary newspaper accounts and the MacArthur hearings the way in which U. S. policy-makers perceived and interpreted the North Korean aggression. An attempt is also made to show that the U. S. reaction to the aggression was influenced by uncertainty as to broader Soviet intentions. (Author)

AD-604 324 Div. 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
POSSIBLE U. S. MILITARY STRATEGIES,
by Bernard Brodie. 11 Oct 54, 21p P-524 rev.
Unclassified report

Editorially amended version of a speech presented at the Army War College, 30 Mar 54.

Descriptors: (*Military strategy, United States), (*Nuclear warfare, Military strategy), Military tactics, USSR, Strategic air command, Strategic warfare, Nuclear weapons, Deterrence, Defense systems, Cold war, Limited war, Foreign policy.

AD-604 325 Div. 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME NOTES ON THE EVOLUTION OF AIR DOCTRINE,
by Bernard Brodie. 1 Dec 54, 32p P-527 rev.
Unclassified report

Descriptors: (*Military strategy, Aerial warfare), (*Strategic air command, Strategic bombing), (*Tactical bombing, Air defense command), Military intelligence, Nuclear weapons, Command and control systems, Theory, Aircraft defense systems.

20. Nuclear Physics and Nuclear Chemistry

AD-603 599 Div. 20, 2, 12
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
TIME BEHAVIOR OF CHARGED PARTICLES INJECTED BY 1962 HIGH ALTITUDE RUSSIAN NUCLEAR TESTS.
Master's thesis,
by George Albert Kuck. Aug 64, 101p
AFIT GSP/Phys/64 8

Unclassified report

Descriptors: (*Nuclear explosions, Charged particles), (*Charged particles, Radioactive fallout), (*Radioactive fallout, Geophysics), High altitude, USSR, Nuclear radiation spectrometers, Radiation measurements systems, Scientific satellites, Terrestrial magnetism, Beta particles, Radioactive decay, Scintillation counters.

The time behavior of the concentration of charged particles injected by the 1962 high altitude Russian nuclear test series was followed by the instruments on Air Force satellite 1962 BK. Two wide angle radiation detectors were able to follow the time decay of the charged particles for 45 days after the explosions. The data for this time period was analyzed and presented as pitch angle distributions and maximum counting rates of the detectors in the L shell regions of space 1.70-2.00 at different magnetic latitudes. The decay rate of the injected charged particles in these L shells was consistent with an exponential decay having a 'half life' of between 9 and 18 days. (Author)

AD-603 601 Div. 20
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
RESONANCES IN THE S32, 33, 34 (p, gamma) C133, 34, 35 REACTIONS WITH BOMBARDING ENERGIES IN THE ONE MEV TO TWO MEV RANGE.
Master's thesis,
by Anthony Kalil Hyder, Jr. May 64, 99p
AFIT GSP/Phys/64 6

Unclassified report

Descriptors: (*Atomic energy levels, Chlorine), (*Chlorine, Atomic energy levels), (*Nuclear resonance, Sulfur), Proton capture, Proton bombardment, Gamma rays, Nuclear reactions, Radioactive isotopes, Excitation, Nuclear structure, Proton accelerators.

A search for resonances in the S32, 33, 34 (p, gamma) C133, 34, 35 reactions for proton energies in the one to two MeV range was conducted. Natural sulfur targets, in elemental form with a thin gold overlay, with thicknesses about 5 keV for 1.5 MeV protons, and enriched S33 and S34 targets, in Ag2S compound form, with thicknesses about 1-2 keV for 1.5 MeV protons, were used. Gamma rays were detected at 55 degrees relative to the proton-beam direction. In each of the three yield curves, pulses were counted simultaneously with three scalers biased for selected gamma-ray energies. Approximately thirty S34 resonances were found in the energy region studied. Most of the observed resonance widths were less than or equal to 2 keV. In the S33 yield curve, twelve prominent resonances, with widths less than or equal to 2 keV, were observed in addition to others previously known. Above 1600 keV, evidence for many weak, closely-spaced S33 resonances was found. (Author)

AD-603 603 Div. 20
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THEORETICAL CALCULATION OF NEUTRON AGE.
Master's thesis,
by Robert Hans Hansen. Aug 64, 127p
AFIT GNE/Phys/64 7

Unclassified report

Descriptors: (*Neutron age, Determination), (*Fission neutrons, Neutron age), (*Integral equations, Neutron transport theory), (*Differential equations, Neutron transport theory), Integral transforms, Special functions (Mathematical), Reactor lattice parameters, Programming (Computers), Neutron cross sections.

This report describes a method for computation of neutron age to the indium resonance in arbitrary mixtures of nuclides. Ages of fission neutrons in a wide variety of modulators were calculated. The method is the Fourier transformed moments solution of the Boltzmann equation, evaluated with multigroup techniques. Initially, the evaluation was for 68 groups; however, the number of groups was systematically reduced until an eleven group set was selected as a reasonable compromise between accuracy and ease of computation. The program not only computes group ages, but also provides a slowing down spectrum of average group fluxes per unit lethargy versus lethargy. Combined with a cross section averaging subroutine, this code could provide all required fast constants for a few group reactor physics problem. The final code will handle any number of groups up to twenty. Input data for any one problem is minimal, the main portion of the input consists of a punched card cross section library. It is an economic, simple to execute, versatile code, which meets the engineering accuracy criteria initially postulated. (Author)

AD-603 608 Div. 20, 8
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A DOSIMETRY SYSTEM FOR THE FLASH X-RAY.
Master's thesis,
by Ward F. Petrie. Aug 64, 113p
AFIT GSP/Phys/64 12

Unclassified report

Descriptors: (*Dosimeters, X rays), (*Flash radiography, Dosimeters), (*Radiation damage, Electronic equipment), Lithium compounds, Fluorides, Health physics instrumentation, Luminescence, Design, Performance (Engineering), Mathematical analysis, Equations, Dose rates.

A dosimetry system for the Flash X-ray, which is a pulsed radiation source, was sought. A system must meet the criteria which the Flash X-ray's characteristics dictate. These are energy independence in the range 40 kev to 600 kev, dose-rate independence in the range 10 to the 7th power to 10 to the 9th power r/second and sensitivity as low as 100 mr. All systems were eliminated except the LiF thermoluminescent dosimeter. A design for a reader was obtained from Los Alamos Scientific Laboratories. It was modified and the resultant reader was a more simple design, but still made a more flexible system. The system was checked out and was found to function very well. In particular, the system had a range from 100 mr to 500 r and better than 1% linearity in response. Recommendations on further work and improvements for the system were made as a result of this work. These included the areas of checking the actual dose-rate and energy independence, several system refinements and data conversion.

Descriptors: (*Space navigation, Feasibility studies), (*Lunar trajectories, Position finding), Moon, Earth, Space flight, Lunar craft, Sextants, Velocity, Measurement, Errors.

The purpose of the study is to determine the feasibility of using a recursive navigation theory in which individual earthmoon angular measurements (fixes) are processed as they are made and combined with the current best estimate of position and velocity to produce an improved estimate. Estimates made with an earth-moon fix interval of 5 minutes or less are compared to estimates made with conventional earth-star, moon-star fixes of 15 minutes. Results show the earth-moon fix to be a feasible technique. (Author)

AD-603 959 Div. 19, 1
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE FEASIBILITY OF A VELOCITY-DAMPED INERTIAL NAVIGATION SYSTEM.
Master's thesis,
by Albert Ray Turley and Robert John Wilson, III.
Aug 64, 122p
AFIT GGC/EE/64 18

Unclassified report

Descriptors: (*Inertial navigation, Feasibility studies), (*Damping, Velocity), Acceleration, Errors, Flight paths, Mathematical analysis, Digital computers, Aerial photography, Oscillation.

A passive inertial navigation system generates position information containing an oscillating error. Previous flight-test results of a gimballess navigator clearly indicate this unwanted oscillation. External velocity information, reduced from aerial photographs, was successfully employed in the study to damp the oscillation in flights under the same dynamic environment. Comparison of undamped and damped position error curves proves velocity damping had little effect on average system error, but improves position uncertainty by approximately 43%. To optimize the inertial system for all flight conditions, the study results suggest a variable damping ratio. Values of 0.7 prior to take off and between 0.07 and 0.1 after take off are recommended. (Author)

AD-604 067 Div. 19
OTS Prices: HC $5.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
INVESTIGATION OF OPTICAL DOPPLER SUBCARRIER REFLECTED SIGNAL LOSS ATTRIBUTED TO COHERENCE EFFECTS AT HIGH MODULATION FREQUENCIES.
Master's thesis,
by Ronald James Basso. Jun 64, 164p
AFIT GGC/EE/64 2

Unclassified report

Descriptors: (*Doppler navigation, Doppler systems), (*Doppler systems, Lasers), (*Lasers, Doppler systems), Doppler radar, Beams (Electromagnetic), Scattering, Reflection, Phase distortion, Diffusion, Targets, Mathematical analysis, Analog computers, Frequency shift, Propagation, Modulation, Degradation, Signals.

The theoretical discussion indicates the subcarrier remains coherent after reflection from optically diffuse targets. To verify this analysis, the output of a HeNe cw gas laser is split into two beams of equal intensity each of which is reflected back to a photomultiplier by two diffuse targets. The results indicate that the received subcarrier amplitude varies as the determinent cosine (pi path difference/subcarrier wavelength). Since the phase relationship is predictable, it is concluded that the theoretical analysis is correct. The beam spread reflection loss is initially examined using analog computer circuitry to determine the amplitude of the reflected subcarrier for various values of maximum phase spread. By lengthening the far-field laser beam over a diffuse aluminum chaff target, actual reading of relative reflected subcarrier amplitude are taken. Both theoretical and experimental evaluations indicate that an 80 to 100 per cent reduction in signal reflectivity will be experienced when the phase spread exceeds two wavelengths of the modulation frequency.

NUCLEAR ANALYSIS OF GASEOUS CORE REACTORS USING AN APPROXIMATE MULTI-GROUP TRANSPORT THEORY TECHNIQUE.
Master's thesis,
by Brian G. Stephan. Aug 64, 139p
AFIT GNE/Phys/64 16

Unclassified report

Descriptors: (*Nuclear reactors, Analysis), (*Reactor theory, Graphite moderated reactors), Nuclear propulsion, Mathematics, Neutron flux, Nuclear scattering, Absorption, Differential equations, Uranium, Vapors, Programming (Computers), Fission products, Reactor cores, Integral equations.

The results of a one-group transport theory analysis, which employs a technique for estimating the epithermal fission yields, are compared to a recent, more rigorous fourteen group transport theory analysis of a gaseous core reactor. The model used for this study is a spherical gaseous core reactor, homogeneously fueled with U235 and moderated by graphite at 4000K.

AD-603 689 Div. 20, 14, 17
OTS Prices: HC $2.00/MF $0.50

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST. ABSTRACT NO. 24527 TO 24600. PART I.
Rept. for 1-31 Jul 64.
10 Aug 64, 30p REIC-MAL-77
Contract AF33 615 1124

Unclassified report

Descriptors: (*Radiation damage, Materials), (*Bibliographies, Radiation damage), Abstracts, Metals, Ceramic materials, Single crystals, Organic materials, Polymers, Inorganic compounds, Electronic equipment, Circuits, Transducers, Semiconductors, Space environmental conditions, Nuclear reactors, Radiation chemistry, Radiation measurement systems, Steel, Copper alloys, Nickel alloys, Reactor materials, Textiles, Guided missile components, Solar cells, Programming (Computers), Shielding, Scientific satellites, Semiconductors, Glass.

A bibliography of 74 abstracts is presented concerning the effects of radiation on metallic, ceramic, polymeric, organic, and inorganic materials; electronic materials, components, and devices; test facilities; space environment and effects on materials; and experimental devices and techniques.

AD-603 708 Div. 20, 8, 14, 17
OTS Prices: HC $4.00/MF $1.00

Radiation Effects Information Center, Columbus, Ohio.
RADIATION-EFFECTS STATE OF THE ART, 1963-1964.
Summary rept. no. 7,
by Donald J. Hamman, Eugene N. Wyler, Richard K. Thatcher, Walter H. Veazie, Jr., and Fred R. Shober.
30 Jun 64, 146p REIC-34
Contracts AF33 615 1124 and AF33 657 10085, continuation,

Unclassified report

Descriptors: (*Radiation damage, Reviews), Electronic equipment, Semiconductor devices, Plastics, Elastomers, Lubricants, Surface-active substances, Flotation, Hydraulic fluids, Ceramic materials, Space environmental conditions, Dosimeters, Metals, Alloys, Bibliographies.

Developments in the field of radiation effects on electronic components including semiconductors, polymeric materials, lubricants, flotation fluids, hydraulic fluids, structural metals and alloys, ceramics, space radiation environment, and dosimetry are reviewed. Programs currently being conducted in radiation effects are briefly given for each section of the report. (Author)

AD-603 709 Div. 20
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE KOMPANEETS MODEL FOR RADIO EMISSION FROM A NUCLEAR EXPLOSION.
Memo. rept.
by V. Gilinsky. Aug 64, 28p RM-4134

Unclassified report

Descriptors: (*Radio signals, Nuclear explosions), (*Nuclear explosions, Electromagnetic waves), Compton scattering, Electric fields, Electron density, Electrical conductance, Ions, Secondary emission, Numerical analysis.

The electromagnetic signal from a nuclear explosion is computed using the same method as presented by Kompaneets (A. S. Kompaneets, JETP, 35, 1538 (1958)). It is shown that some of Kompaneets' approximations are incorrect and lead to the wrong shape for the radiated signal. His work neglects the important first half-cycle of the signal and hence predicts an initial deflection in the wrong direction. A more correct solution is presented. (Author)

AD-603 770 Div. 20, 8
OTS Prices: HC $2.00/MF $0.50

Dewey (G. C.) Corp., New York.
AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF RADIATION OF THE PROPAGATION OF ELECTROMAGNETIC SIGNALS IN AIR.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 64,
by M. N. Hirsh and P. N. Eisner. 31 Mar 64, 26p
Dewey-R-173-3
Contract DA36 039AMC03278E

Unclassified report

Descriptors: (*Radiation damage, Electromagnetic waves), (*Electromagnetic waves, Radiation damage), Mass spectroscopy, Spectrum analyzers, Optical instruments, Vacuum apparatus, Photomultipliers, Signal-to-noise ratio, Ion beams, Ionic current, Nitrogen, Oxygen, Mixtures, Gas ionization, Measurement, Electron density, Atmosphere, Ionization, Propagation.

The report begins with a description of several changes made in the optical spectrometer system and vacuum chamber. The results of mass spectrometer measurements on irradiated gases are included; of particular importance in these results is the identification of O4 (+) as the dominant positive ion in O2 and 2-1, N2-O2 mixtures at least at pressures between 1 and 10 Torr. The results of electron loss rate measurements in N2-02 mixture are presented. Some atmospheric processes are mentioned.

AD-603 830 Div. 20, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
STOCHASTIC (MONTE CARLO) ATTENUATION ANALYSIS,
by H. Kahn. Rev. 14 Jul 49, 21p P-88

Unclassified report

AD-603 609 Div. 20, 30.
OTS Prices: HC $5.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE DESIGN OF A CRYOSTAT FOR THE AIR FORCE NUCLEAR ENGINEERING TEST FACILITY.
Master's thesis,
by Ernie Donald Braunschweig. Aug 64, 158p
AFIT GNE/Phys/64 3

Unclassified report

Descriptors: (*Reactor system components, Cryostats), (*Cryostats, Reactor system components), (*Nuclear engineering, Test facilities), Air Force, Design, Neutron flux, Fast neutrons, Helium, Liquefied gases, Reactor coolants, Reactor shielding materials, Radiation damage, Gamma rays, Low temperature research, Nuclear reactors, Heat transfer, Radiation measurement systems, Cryogenics.

A liquid helium cryostat for nuclear irradiation experiments to be performed at the Air Force Nuclear Engineering Test Facility was designed for use in the reactor beam tubes. Liquid helium consumption due to thermal heat transfer is reduced to 0.13 liter/hr by gas cooled shields around the sample chamber and in the transfer line. The low consumption rate will allow operation using liquid helium from a storage dewar. Gamma radiation is the largest heat source in the cryostat and must be reduced with a gamma shield. Fast neutron heating of the helium coolant is significant and may limit the fast neutron flux to which the cryostat can be exposed to less than 10 to the 12th power n/sq cm sec. Operating the cryostat with liquid helium in the reactor does not endanger reactor control or structure. The cryostat can be operated with a wide range of coolants and can be readily modified for any sample chamber smaller than a cylinder 4 inches in diameter and 8 inches long. (Author)

AD-603 610 Div. 20
OTS Prices: HC $4.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A FEASIBILITY STUDY OF A HIGH-TEMPERATURE, LIQUID ALUMINUM COOLED, FLUIDIZED BED NUCLEAR POWER REACTOR.
Master's thesis,
by Kenneth Robert Hooks. Aug 64, 140p
AFIT GNE/Phys/64 10

Unclassified report

Descriptors: (*Power reactors, Reactor feasibility studies), (*Liquid metal cooled reactors, Reactor feasibility studies), High temperature research, Aluminum, Aluminum compounds, Nitrides, Uranium compounds, Fluid flow, Heat transfer, Nuclear cross sections, Physical properties, Mathematics, Thermal properties, Compatibility, Reactor fuel cladding, Reactor cores.

A feasibility study of a high temperature, liquid-metal-cooled nuclear power reactor depends upon considerations of materials, heat transfer, fluid flow and nuclear parameters as well as certain design guidelines. The criteria of a coolant outlet temperature of 2000C and a low pressure core, plus good nuclear and heat transfer properties, led to the choice of liquid aluminum as the coolant. A compatibility study determined the only aluminum mononitride is inert to aluminum at 2000C, and must be used for constructing the core. Fuel elements of uranium mononitride were chosen on the basis of probable compatibility with the required aluminum nitride cladding. Consideration of the heat transfer effects led to the choice of micron-size coated fuel particles in a cylindrical fluidized bed core. Three methods of determining the parameters of the fluidized bed were used to indicate the best particle size and aluminum flow rate in the core for any desired power level. The nuclear parameters of the system were studied using two-group diffusion theory and an infinitely reflected spherical geometry. The results predict a fast core with a critical mass above ten kilograms, and indicate that the reactor may be made inherently stable by correct design of the core. (Author)

AD-603 614 Div. 20, 21
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
NUCLEAR CRITICALITY CALCULATIONS ON A SPHERICALLY SYMMETRIC GASEOUS-CORE REACTOR.
Master's thesis,
by John R. Rec. May 64, 118p
AFIT GNE/Phys/64 14

Unclassified report

Descriptors: (*Critical assemblies, Theory), (*Nuclear reactors, Critical assemblies), Fast neutrons, Fission neutrons, Thermal neutrons, Absorption, Scattering, Fission, Uranium, Vapors, Programming (Computers), Mathematics, Graphite moderated reactors, Nuclear propulsion, Reactor cores.

The nuclear criticality calculations are performed on a two-region, spherically symmetric gaseous-core reactor. The core is fueled with U235 vapor and is externally moderated by various thicknesses of graphite at 4000K. A one-group (thermal) transport analysis with a fast effect correction, which accounts for above-thermal fissions and absorptions, is used to perform the criticality calculations. The thermal-group analysis is developed by applying the Sn transport approximation to the one-velocity, one-dimensional, time-independent Boltzmann transport equation. Age-diffusion theory is used to estimate the fast effect correction. The criticality calculations are done on the IBM 7090 digital computer, and results are compared with results from a multi-group transport analysis for similar reactor configurations.

AD-603 666 Div. 20
OTS Prices: HC $2.00/MF $0.50

Atomics International, Canoga Park, Calif.
SUPERCONDUCTING NUCLEAR PARTICLE DETECTOR.
Trimonthly rept. no. 1, 25 Mar-25 Jun 64,
by D. E. Spiel and R. W. Boom. 25 Jun 64, 34p AI-64-159
Contract DA18 035AMC107A

Unclassified report

Descriptors: (*Radiation measurement systems, Superconductors), (*Superconductors, Radiation measurement systems), Alpha particle detectors, Manufacturing methods, Films, Tin, Vapor plating, Cryogenics.

The period was devoted mainly to the design, construction, procurement, and testing of the equipment necessary to the task performance. Several films, however, were manufactured, characterized, and subjected to alpha bombardment. During this irradiation, both propagating and, more significantly, nonpropagating pulses were observed. The amplitudes of these self-recovering pulses varied from 100 micro-v to 300 micro-v, nearly an order of magnitude larger than calculated. The pulse widths at half maximum were 20 ns, the limit of the equipment. Critical current vs temperature data for several films are consistent with the results reported by others. (Author)

AD-603 683 Div. 20, 21
OTS Prices: HC $4.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

AD-604 195 Div. 20
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
REGULARITIES IN THERMAL NEUTRON ABSORPTION CROSS SECTIONS.
Interim rept.
by S. Podgor and L. A. Beach. 21 Jul 64, 16p
RR002 06-41-5006
NRL 6124

Unclassified report

Descriptors: (*Thermal neutrons, Neutron cross sections), (*Neutron cross sections, Neutron absorption), Odd-even nuclei, Even-even nuclei, Nuclear forces, Tables.

Thermal neutron absorption cross sections have generally not been considered to show much systematics. However, some regularities are brought out which may not have been stated before. Each stable odd Z(i)-even N(j) nucleus has a higher cross section than the corresponding even (Z(i) - 1)-even N(j) nucleus, with very few exceptions. The odd Z nuclei show a pronounced cyclic variation in cross section, while the corresponding even Z nuclei have considerably less variation. Justifications for these rules are presented on the basis of the existence of a pairing force in the nucleus. Suggestions are given for additional cross section measurements to be made. These involve the determination of cross sections of stable, as well as, radioactive nuclei. (Author)

AD-604 287 Div. 20
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica. Calif.
SOME ECONOMIC ASPECTS OF FISSIONABLE MATERIAL,
by Stephen Enke. 25 Nov 53, 24p P-462 Unclassified report

Descriptors: (*Radioactive isotopes, Economics), Uranium, Plutonium, Production, Military requirements, Optimization, Military strategy, Linear programming, Costs, Management engineering.

The determination of an optimum program for the production, allocation, and use of fissionable material involves a number of economic suboptimizations, once important political and military decision have been made. The economic optimization involves other suboptimizations in turn, one for the AEC, another for the DOD, and conceivably for individual Services and campaigns. Linear programming provides a means of handling a number of these small optimizations and the institution of shadow prices permits a decentralized method of solution. Despite the secrecy that surrounds it, fissionable material is preeminently an economic good, and economists with the necessary clearances should be capable of an important contribution to national defense. (Author)

21. Nuclear Propulsion

No Entries

This is an advance copy of an article written for Nucleonics.

Descriptors: (*Monte Carlo method, Neutron absorption), (*Stochastic processes, Neutron absorption), (*Neutron absorption, Sampling), Neutron transport theory, Neutrons, Gamma rays, Absorption, Shielding, Probability, Attenuation.

Applications of random sampling methods to neutron attenuation problems that would be useful to engineers and physicists having but a slight knowledge of statistics are given. The discussion concerns the application of random sampling techniques to the problem of neutron and gamma ray attenuation in thick shields. In such an analysis, deductions about the behavior of a large number of neutrons are made from a study of comparatively few. The technique is quite analogous to public opinion polling of a small sample to get information concerning the population of the entire country.

AD-603 878 Div. 20
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
GAMMA-RAY TRANSMISSION,
by R. Latter. 27 Apr 50, 12p P-147
Unclassified report

Descriptors: (*Gamma rays, Wave transmission), Integrals, Integration, Partial differential equations, Functions, Shielding.

An approximate equation for the transmission of gamma rays through a slab of finite thickness is derived. This equation is an immediate generalization of Bethe's one-dimensional equation. While Bethe's equation is valid only for the case of a slab in which the absorption coefficient of the gamma rays varies monotonely with energy, the equation discussed here is not so limited though it possesses other limitations. (Author)

AD-603 883 Div. 20
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SCATTERING AND ABSORPTION OF GAMMA RAYS,
by M. S. Plesset and S. T. Cohen. 1 Jun 50,
42p P-157
Unclassified report

Descriptors: (*Gamma rays, Nuclear scattering), (*Compton scattering, Gamma rays), Absorption, Photoelectric effect, Shielding, Nuclear energy, Nuclear cross sections, Radiation hazards, Air, Lead.

A formulation is presented of the scattering and absorption of gamma rays in different materials. The range of gamma ray energies considered is from 1 to 10 m(c squared). Results are given for the transmission of gamma rays through air and lead. (Author)

AD-603 928 Div. 20, 8
OTS Prices: HC $3.00/MF $0.75

Space General Corp., El Monte, Calif.
DEVELOPMENT OF EQUIPMENT TO CONDUCT AREA SURVEY MEASUREMENTS OF THE ELECTROMAGNETIC PULSES FROM NUCLEAR EXPLOSIONS.
Final rept. for 1 Jul 63-2 Apr 64,
by Kenneth Schwartz. 2 Apr 64, 83p SGC-406R-2
Contract DA49 146XZ236
DASA 1499
Unclassified report

Descriptors: (*Nuclear explosions, Electromagnetic waves), (*Electromagnetic waves, Radiation measurement systems), (*Radiation measurement systems, Electronic equipment), Measuring devices (Electrical and electronic), Magnetic fields, Electric fields, Circuits, Amplifiers, Signals, Design, Tests.

Two devices were designed to be used for measuring the peak electric or magnetic field generated by an atmospheric nuclear explosion. These devices are low cost, rugged, battery operated, and easily deployable instruments. One of the instruments makes measurements in discrete steps. As presently designed, it covers a dynamic range of 48 db in six db steps. The second device, which uses a cathode ray tube and photographic film to provide a continuous measurement scale, has a dynamic range of 54 db.

AD-604 018 Div. 20
OTS Prices: HC $4.00/MF $1.00

Princeton Univ., N. J.
REGENERATION OF K1 MESONS AND THE K1 - K2 MASS DIFFERENCE.
Technical rept. no. 34,
by James H. Christenson. 30 Jul 64, 143p
Contract Nonr1858 06
Unclassified report

Doctoral thesis.

Descriptors: (*K mesons, Nuclear reactions), Strange particles, Leptons, Radioactive decay, Meson bombardment, Spectrum analyzers, Radiation measurement systems, Meson cross sections, Carbon, Copper, Iron, Tungsten, Meson scattering.

The regeneration of K1 mesons in solid materials was studied, using a beam of K2 mesons. A pair of magnet-spark chamber spectrometers were employed to momentum analyze the pions from the K1 decays. Using copper regenerators, the transmission regeneration is found to indeed be coherent. The mass difference was measured with a regenerator consisting of two pieces of copper, separated by a gap of variable width. This method is independent of all nuclear parameters and yields a mass difference of .50 ± .10. Two independent analyses of data taken with various thicknesses of copper as regenerators, yield mass differences consistent with the gap measurement. Mass differences larger than 1 are strongly rejected by our data. The forward regeneration cross section for C, Cu, Fe, and W, were measured and found to agree with optical model calculations. All data find explanation within the framework of the regeneration theory. (Author)

AD-604 133 Div. 20
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SPONTANEOUS FISSION VERSUS ALPHA-DECAY,
by Arnold Kramish. 2 Jul 52, 5p P-307
Unclassified report

Descriptors: (*Fission, Decay schemes), (*Alpha decay, Decay schemes), Radioactive decay, Half life, Nuclei, Neutrons.

A plot of the ratio of spontaneous fission half-lives to alpha disintegration half-lives vs. the fissionability parameter (Z square/A) indicates that, in the case of even-even nuclei, the spontaneous mode of decay becomes the more predominant as Z square/A increases. The opposite appears to be true for odd-neutron nucleides. The effect of the odd neutron may be such as to favor an anomolously higher frequency for a highly assymetric configuration; i.e., a configuration leading to alpha decay.

AD-604 071 Div. 22, 18, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE WHAT AND THE HOW ARE BOTH ESSENTIAL TO MUNITIONS PRODUCTION,
by David Novick. 3 Mar 52, 8p P-273

Unclassified report

Descriptors: (*Munitions industry, Management engineering), Management planning, Ordnance, Weapons, Production, Budgets, Money, Economics, Manufacturing methods.

An overview of U. S. manufacturing industries indicates that the firms having the greatest manufacturing know-how are primarily interested in non-war goods and regard their occasional entries into the production of munitions as a necessary but undesirable sacrifice to patriotism. The conclusion is drawn that in order to get weapons at low cost and when they are needed, the production of munitions must be made stable enough and respectable enough to either (a) attract those who now have the know-how into the business on a permanent basis or (b) create a new competitive industry which will create its own type of know-how.

AD-604 102 Div. 22
OTS Prices: HC $0.75/MF $0.50

Harry Diamond Labs., Washington, D. C.
A PROCEDURE FOR DEVELOPMENTAL DROP-TESTING SAFETY AND ARMING MECHANISMS CONTAINING TIME-INTEGRATION SYSTEMS,
by Arthur Hausner. 25 Jun 64, 28p
Projs. DA1P523801A300, 46300
HDL TR1239

Unclassified report

This rept. was previously issued as HDL R320 61 4, 15 Feb 61.

Descriptors: (*Drop testing, Fuzes (Ordnance)), (*Arming devices, Safety), Acceleration, Impact shock.

The general ordnance developmental drop-test program is discussed with an aim toward establishing a procedure for drop-testing time-integration systems in safety and arming mechanisms. An attempt is made to justify use of impact media that give rise to approximately constant acceleration-time characteristics as being the most practical means of insuring safety for a given drop height and, at the same time, of providing the most reliable index of safety that can be experimentally determined. An example of how the procedure is used is also described. (Author)

22. Ordnance

AD-603 540 Div. 22, 9
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
CHAPMAN-JOUGUET PRESSURES OF SEVERAL PURE AND MIXED EXPLOSIVES,
by N. L. Coleburn. 25 Jun 64, 24p
NOL TR64 58

Unclassified report

Descriptors: (*Explosion effects, Explosive materials), Explosions, Pressure, Shock waves, Propagation, Water, Measurement, High speed photography, Equations of state, Entropy, TNT, Pentolite, RDX, PETN, Tetryl.

The Chapman-Jouguet pressures and reaction product isentropic exponents of fifteen pure and mixed explosives were measured. Smear camera shadowgraphs were made of cylindrical shock waves these explosives transmit into water. From these measurements and the water shock Hugoniot, the co-ordinates of the intersection point were determined in the pressure-velocity plane between the water shock wave and the rarefaction wave reflected back into the detonation products. The isentrope passing through the Chapman-Jouguet pressure-volume point was obtained assuming the products obey a polytropic equation of state (PVk = constant). Chapman-Jouguet pressures of 187.2 kilobars, 264.1 kilobars, and 245.5 kilobars respectively were measured for cast charges of TNT, Composition B and pentolite. Pressed charges of RDX at 1.63 g/cc, PETN at 1.568 g/cc, and Tetryl at 1.614 g/cc gave detonation pressures of 283.7 kilobars, 239.9 kilobars, and 226.4 kilobars respectively. (Author)

AD-603 638 Div. 22
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
THE FIRING CHARACTERISTICS OF THE STANDARD ATLAS ELECTRIC MATCH,
by Malcolm B. Templeman. 9 Jun 64, 24p
NOL TR63 62

Unclassified report

Descriptors: (*Explosives initiators, Electrical properties), Fuze functioning elements, Firing mechanisms (Ammunition), Sensitivity, Voltage, Electric currents, Electromagnetic pulses, Firing circuits, Firing tests (Ordnance), Ordnance.

The firing sensitivity of both M-100 and M-200 Atlas electric matches is determined for instances when the firing signal duration is in the range 1 to 6 milliseconds. Tests were conducted by supplying either a constant voltage or constant current pulse to the match. The results indicate that there is no significant difference between these matches or between lots of matches. The energy and voltage required to reliably fire these matches within six milliseconds are described as a function of pulse duration. (Author)

AD-603 656 Div. 22
OTS Prices: HC $3.00/MF $0.75

Naval Ordnance Lab., White Oak, Md.
BEHAVIOR OF PLEXIGLAS UNDER SHOCK LOADING BY A TETRYL DONOR,
by I. Jaffe, J. Toscano, and D. Price. 2 Jul 64, 91p
NOL TR64 66

Unclassified report

Descriptors: (*Explosive materials, Sensitivity), (*Acrylic resins, Explosion effects), Explosives initiators, Tetryl, Shock waves, Attenuators, Plastics, Loading (Mechanics), Stresses, Photographic analysis, Propellants, Detonation.

Details of the disturbance in shock loaded Plexiglas were observed with a smear camera and with the Jacobs framing camera; both exploding wire and diffuse lighting were used. Records obtained by the various techniques are compared; it is found that several techniques should be used to obtain the most complete information about the observed phenomena. Experiments to establish pressure as a function of distance in a 5.08 x 5.08 x 12.7 cm rectangular parallelopiped of Plexiglas, shocked by a tetryl donor, result in a shock velocity (or pressure) vs. distance curve, within experimental precision, the same as that for a Plexiglas rod of 5.08 cm diameter. Shock front curvature and the average unloading rate between shock and break-up, each shows a discontinuity when plotted as a function of length of shock path through the material. The point of discontinuity is at 2.54 cm, the radius of the shock loaded surface, and is attributed to the arrival and intersection of the lateral rarefactions at the axis of the block. (Author)

AD-603 711 Div. 22, 25
OTS Prices: HC $1.00/MF $0.50

Springfield Armory, Mass.
DYNAMIC FORMULATION OF COEFFICIENT OF RESTITUTION.
Technical rept.,
by E. H. Jakubowski. 7 Feb 64, 20p
SA TR20 2811

Unclassified report

Descriptors: (*Differential equations, Programming (Computers)), (*Gun components, Motion), Analog computers, Gun barrels, Automatic weapons, Small arms, Deformation, Springs, Damping, Mathematical models.

The paper is concerned with the preparation of a mathematical model involving collisions between two bodies and the subsequent analog computer program. It considers a fictitious damped spring as a coefficient of restitution generator'. Formulae are derived for spring stiffness and the viscous damping in both one and two degrees, of freedom. (Author)

AD-603 757 Div. 22, 10
OTS Prices: HC $1.00/MF $0.50

Bureau of Mines, Pittsburgh, Pa.
SENSITIVITY CHARACTERISTICS OF LIQUID EXPLOSIVE SYSTEMS.
Progress rept. no. 10, 1 Apr-30 Jun 64,
by Frank C. Gibson, John Ribovich, and J. Edmund Hay. Jul 64, 24p
Contract IPR19 64 8026WEPS

Unclassified report

Descriptors: (*Explosive materials, Sensitivity), (*Detonation waves, Measurement), Propellants, Probes (Electromagnetic), Shock waves, Liquids, Organic solvents, Nitroglycerin, Glycols, Nitrates, Triacetin.

Emphasis was placed on developing new techniques for continuously following the development of both high velocity and low velocity detonations. Probes were devised to distinguish between inert shocks and reaction pressure waves in the liquid. A shock sensitivity scale for comparing casting solvents was established with the nitroglycerin-ethyleneglycol dinitrate (NG-EGDN)-triacetin (TA) system. (Author)

AD-603 646 Div. 23
OTS Prices: HC $2.00/MF $0.50

Michigan Univ., Ann Arbor.
REPORT OF A STUDY TOUR OF EUROPEAN INDUSTRIAL THERAPY PROGRAMS WITH SPECIAL REFERENCE TO THE REHABILITATION OF OLDER PEOPLE,
by Dorothy H. Coons. 1964, 41p
Unclassified report

Supported in part by Office of Manpower, Automation and Training, U. S. Department of Labor.

Descriptors: (*Industrial training, Europe), Instructors, Labor, Menatal disorders, Aging (Physiology), USSR, Sweden, Denmark, Netherlands.

A report is given of a study tour undertaken for the purposes of assessing industrial therapy programs, especially as applied to the rehabilitation of mentally ill older persons, and sheltered workshops in the United Kingdom, Sweden, Denmark, and the Netherlands, and of determining what, if any, specialized training is available to prepare persons to work in the positions of industrial therapists. The observations were made in the fall of 1963. (Author)

AD-603 647 Div. 23
OTS Prices: HC $7.00/MF $1.50

Institute of Industrial Relations, Univ. of California, Berkeley.
RETRAINING AND LABOR MARKET ADJUSTMENT IN WESTERN EUROPE,
by Margaret S. Gordon. Jul 64, 304p
Unclassified report

Report submitted to Office of Manpower, Automation, and Training, U. S. Department of Labor.

Descriptors: (*Retraining, Personnel management), (*Labor, Retraining), Transfer of training, Education, Economics, Government (Foreign), Western Europe.

Contents:
Postwar labor market development; Retraining in the first postwar decade, 1945-1955; Retraining in tighter labor markets, 1955-1964; Older workers, younger workers, and other special groups; Results of retraining;
Current and future problems.

AD-603 913 Div. 23, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A FORMAL THEORY OF THE EMPLOYMENT RELATIONSHIP,
by Herbert A. Simon. 7 Dec 50, 19p P-204
Unclassified report

Descriptors: (*Industrial relations, Decision making), (*Personnel management, Decision theory), Labor, Leadership, Behavior, Management planning, Game theory, Set theory, Probability, Models (Simulations).

A model was constructed that incorporates rational grounds for the choice by two individuals between an employment contract and a contract of the ordinary kind (which we have called a sales contract). By a generalization of this model one can account for the fact that in an employment contract certain aspects of the workers's behavior are stipulated in the contract terms, certain other aspects are placed within the authority of the employer, and still other aspects are left to the worker's choice. Since administrative theory was interested in explaining behavior within the framework of employment relations, and economic theory in explaining behavior within the area of market relations, the model suggests one possible way of relating these two bodies of theory. The most serious limitations of the model lie in the assumptions of rational utility-maximizing behavior incorporated in it. (Author)

AD-604 000 Div. 23
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RELIABILITY OF ESTIMATES OF UNFREE LABOR IN THE USSR,
by A. D. Redding. 2 Jan 52, 8p P-260
Unclassified report

Descriptors: (*Manpower studies, USSR), (*Labor, USSR), Economics, Personnel, Construction, Industrial production, Statistical analysis, Reliability, Social sciences.

The official USSR Plan for 1941 gives output data both for the entire economy and the NKVD (the commissariat responsible for unfree labor), as well as input data for free laborers only. The problem is to estimate from this information the size of the unfree labor force.

AD-604 078 Div. 23, 32
OTS Prices: HC $4.00/MF $0.75

RAND Corp., Santa Monica, Calif.
TRENDS AND PROSPECTS OF THE SOVIET POPULATION AND LABOR FORCE,
by Warren W. Eason. 17 Dec 52, 102p P-289, rev.
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Population, USSR), (*Labor, USSR), (*Man power studies, USSR), Growth, USSR, Industrial production, Social sciences.

This paper is a summary exposition of Soviet population and labor force development under the five-year plans, followed by an examination of the degree to which future development can be expected to adhere to, or depart from, past trends. The population trends are drawn in terms of the total number of persons, their distribution by age and sex, and the birth and death rates. The growth of the labor force, set against the growth of the population, is analyzed in terms of the distribution by economic sectors. (Author)

AD-604 144 Div. 23, 33
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
EMPLOYMENT AND LABOR PRODUCTIVITY IN USSR RAILROADS 1928-1950,
by A. David Redding. 15 Sep 52, 35p P-327
Unclassified report

Descriptors: (*Railroads, Manpower studies), Labor, Classification, Traffic, Growth, Economics, Time studies, Transportation, Trade unions, Statistical analysis, USSR.

AD-604 184 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Washington Univ., St. Louis, Mo.
THE VALIDITY OF PEER RATINGS FROM OCS IN PREDICTING OFFICER PERFORMANCE: A FOLLOW-UP OF THE 1955 NEWPORT STUDY.

23. Personnel and Training

AD-603 569 Div. 23, 28, 30
OTS Prices: HC $2.00/MF $0.50

Training Research Lab., Univ. of Illinois, Urbana.
MODEL THE MASTER TEACHER OR MASTER THE TEACHING MODEL.
Technical rept. no. 3,
by Lawrence M. Stolurow. Jul 64, 38p
Contract Nonr3985 04

Unclassified report

Research on Pre-Programed Self-Instruction and Self-Programed Individualized Education.

Descriptors: (*Education, Models (Simulations)), Programming (Computers), Learning, Decision making, Motivation, Aptitude tests, Achievement tests.

The computer program used to make a decision about the contingencies of various events upon the different responses of individual students is an explicit model of teaching. It relates data about individuals such as test scores and performance during learning to each of the decisions made during the instruction of every student. In this sense, it uses the results of the study of individual differences and those of the learning laboratory to produce a testable model of teaching. Hopefully, mastering the teaching model will prove to be more useful than previous efforts at modeling the master teacher. (Author)

AD-603 577 Div. 23, 16, 28.
OTS Prices: HC $1.00/MF $0.50

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
THE PRACTICAL VALUE OF A PSYCHIATRIC SCREENING INTERVIEW IN PREDICTING MILITARY INEFFECTIVENESS,
by John A. Plag. Apr 64, 14p
Task MR005 12 2201
NMNRU 64 7

Unclassified report

Descriptors: (*Personnel management, Psychometrics), (*Naval personnel, Selection), (*Medical examination, Naval personnel), Performance (Human), Recruiting, Abnormal psychology, Adjustment (Psychology), Behavior, Effectiveness, Military requirements, Military medicine, Psychiatry, Measure theory, Classification.

A total of 1903 subjects who enlisted in the Naval service in 1960 were evaluated two years later and five measures of their military effectiveness were compared with clinical predictions made at the time of the brief psychiatric intake interview. Results indicate that while the initial clinical interview has low but statistically significant predictive validity, its unique significance all but vanishes when it is combined with the variables of age, educational achievement, and a measure of intelligence. Significant variations were found to exist in the validity of clinical judgments of above-average and below-average effectiveness depending upon the criterion and level of adaptation utilized. No consistent differences were found in the validity of initial clinical judgments for homogeneous sub-groups of enlistees. These results indicate that the Navy's brief psychiatric intake interview, as currently conducted, is of little practical value in prediction. (Author)

AD-603 579 Div. 23, 16, 28
OTS Prices: HC $1.00/MF $0.50

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
THE VALIDITY OF AGE, EDUCATION, AND GCT SCORE AS PREDICTORS OF TWO-YEAR ATTRITION AMONG NAVAL ENLISTEES,
by John A. Plag and Lawrence E. Hardacre.
Jun 64, 21p
Task MR005 12 2201
NMNRU 64 15

Unclassified report

Descriptors: (*Personal management, Psychometrics), (*Naval personnel, Selection), (*Medical examination, Naval personnel), Aging (Physiology), Education, Classification, Performance (Human), Military requirements, Adjustment (Psychology), Effectiveness, Recruiting, Intelligence tests, Measure theory, Correlation techniques, Statistical analysis, Behavior.

The relationships of the predictor variables of age, education, and GCT score and the criterion of two-year attrition were examined for a group of 1903 naval enlistees. Significant deviations from linearity were noted in the relationship of age and the attrition criterion. Tables showing the probability of two-year service retention were constructed from weighted combinations of GCT score and educational achievement for each of three age levels. (Author)

AD-603 597 Div. 23, 12
OTS Prices: HC $2.00/MF $0.50

Ritchie and Associates, Inc., Dayton, Ohio.
TIME HISTORY AS AN INFORMATION SOURCE FOR OPERATOR CONTROL OF ORBITAL RENDEZVOUS.
Rept. for Jan-Mar 64,
by William K. McCoy, Jr. and George G. Frost.
Jun 64, 37p
Contract AF33 615 1089, Projs. 9509 7184, Task 718402
AMRL TDR64 55

Unclassified report

Descriptors: (*Operators (Personnel), Performance (Human)), (*Rendezvous trajectories, Orbital trajectories), Display systems, Job analysis, Velocity, Control, Interceptor spacecraft, Interception, Analog computers, Time.

A study of operator performance in an orbital rendezvous task was conducted to evaluate a display of the orbit plane (X-Y Plane) for rendezvous and to determine the effects of presenting a time history of the rendezvous as an aid to the operator. The system dynamics were simulated on an analog computer and an X-Y plotter was used as the display system. Total velocity increment expended and frequency and magnitude of control movements were used as performance indices. Range and range-rate less than 10 ft (3.05 meters) and .5 ft/sec (.15 meters/sec) respectively were used as criteria of successful rendezvous. Subjects were instructed to use the two-impulse orbital transfer technique. Subjects were able to rendezvous successfully both with and without the time history information, thus demonstrating that the orbit plane profile display was satisfactory. The addition of time history information resulted in significantly lower velocity increments than those obtained without the time history. In both cases, the velocity increments were below the theoretical minimum for a line-of-sight rendezvous. Analysis of the stick movement data indicated the operator's achieved more efficient control of orbital path with the time history present. (Author)

24. Photography and Other Reproduction Processes

AD-603 545 Div. 24, 8
OTS Prices: HC $3.00/MF $0.75

General Electric Co., Syracuse, N. Y.
MATRIX CONTROLLED DISPLAY DEVICE.
Final development rept. for 1 Jul 63-1 Aug 64.
1 Aug 64, 96p
Contract NObsr89334, Proj. SR080301, Task 9475
Unclassified report

Descriptors: (*Display systems, Optical images), (*Optical equipment, Photographic recording media), Thermoplastics, Surfaces, Deformation, Oils, Prisms (Optics), Light, Modulation, Circuits, Collimators, Electrodes, Resolution, Brightness, Feasibility studies, Optics.

This report describes the results of a program to develop a matrix controlled display using in-air surface deformation recording and TIRP (Total Internal Reflection Prism) projection techniques. An experimental model providing a 32 x 32 elemental portion of the large screen display was constructed. Surface deformable media of thermoplastic and oil were investigated. Matrix electrode fabrication by evaporation and etching techniques were established. Different electrode spacings and widths were evaluated to determine the cell dimensions for an optimum display. Several thermoplastics and heat development methods were investigated to insure fast update times. The program has shown that matrix controlled, in-air thermoplastic recording with TIRP optical readout meets many important performance goals of large screen displays. Among these are reusability, fast update time, long time image storage, high display resolution, and high brightness. Lifetime limits have yet to be established, and improved matrix fabrication techniques are needed to reduce electrode defects. (Author)

AD-603 633 Div. 24, 26
OTS Prices: HC $0.75/MF $0.50

Watervliet Arsenal, N. Y.
AN EVALUATION OF COLOR RADIOGRAPHY FOR INDUSTRIAL USE: THE RE-EXPOSURE METHOD.
Technical rept.
by Carl Blackman. May 64, 29p
WVT II 6410
Unclassified report

Descriptors: (*Radiography, Color photography), (*Color photography, Radiography), Radiographic films, Color films, Quality control, X-ray photography, Wedges, Metals, Photographic materials, Costs, Feasibility studies.

Although no color film is specifically manufactured for radiographic purposes, attempts have been made to produce color radiographs by modifying the producer's suggested film development procedure. Step wedges of aluminum, steel, zirconium, and uranium were radiographed and the film developing process was modified according to procedures established at Argonne National Laboratories. The results, using a positive and a negative type film, and a detailed record of the procedures are presented. The results indicate that color radiographs are difficult to produce, and the process time-consuming and expensive. Areas of possible future investigations are suggested. (Author)

Technical rept.,
by E. P. Hollander. May 64, 10p
Contract Nonr816 12

Unclassified report

Descriptors: (*Officer personnel, Selection), (*Naval personnel, Leadership), Attitudes, Military training, Performance (Human), Personality, Group dynamics, Sociometrics, Mathematical prediction, Correlation techniques.

The follow-up phase of a study of peer nominations begun in 1955 at the Naval Officer Candidate School in Newport, Rhode Island is reported. Over 700 trainees, in the 23 sections comprising an entire OCS class, completed several peer nomination forms at various stages of training. One form, in particular, requiring nomination for success as a future Naval Officer, was administered to all sections. From among the trainees in the original study, 639 were identified who had gone on to duty as officers for a period averaging three years or more. Fitness report ratings given to these officers by their seniors were obtained and averaged to yield a score representing the performance criterion. This score had a corrected split-half reliability of .90. The validity of early peer nominations, already established for performance in OCS, was found to be substantial for the prediction of later performance as an officer. Validity is maintained even after statistical control for academic performance and popularity is applied by the partialing process. It is therefore recommended that early peer nominations, assessing overall performance as an officer, be routinely utilized early in training as a supplement to academic and other evaluations. (Author)

AD-604 229 Div. 23, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SUPPLY OF FEMALE LABOR IN WORLD WAR II,
by A. W. Marshall and J. Hirshleifer. Rev. 5 Feb 54,
37p P-420

Unclassified report

Descriptors: (*Labor, Females), (*Manpower studies, United States), Statistical analysis, Warfare, Wages, Differential equations, Functions, Data, Mobilization, Mathematical models, Economics.

The problem of the report was to analyze the influence of various determinants on the female labor force in the World War II period, and in particular to discover whether the supply curve of (female) labor was backward-sloping, as some analysts had maintained. From the methodological point of view, the most interesting aspect of the study was the attempt to take explicit account of the auto-correlation of the error terms in a multiple regression model.

AD-604 314 Div. 23, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NOTE CONCERNING THE ORGANIZATION OF AN IBM TYPE 701 INSTALLATION,
by John D. Madden. 7 Apr 54, 14p P-505

Unclassified report

Descriptors: (*Programmers, Personnel Management), (*Computer personnel, Personnel Management), (*Job analysis, Programming (Computers)), Computers, Programming (Computers)), Time studies, Classification, Correlation techniques, Cameras.

A brief report on three projects in the RAND Numerical Analysis Department is presented. The first is a survey of the organizational setups used at various IBM Type 701 installations. The results give an insight into the philosophies influencing operation of each of eleven computing groups. The second is the development and validation of a test which will help to distinguish good prospects for computing jobs from bad ones. The last is the installation of a camera in the 701 room to expedite checking of machine programs. It is felt that the camera will allow divorcing the programmers from machine operation and that this will effect an increased efficiency in machine utilization. (Author)

presence of an axial magnetic field not only does the lowest resonance (approximately predicted by the cold plasma theory) split, but the next higher order resonance also splits. (Author)

AD-603 534 Div. 25
OTS Prices: HC $5.00/MF $1.00

California Inst. of Tech., Pasadena.
THEORY OF PLASMA WAVE RESONANCES IN A HOT NONUNIFORM PLASMA.
Technical rept. no. 23,
by Jerald V. Parker. Jun 64, 158p
Contract Nonr220 50

Unclassified report

Descriptors: (*Plasma oscillations, Resonance), Theory, Electric fields, Radiofrequency, Electrons, Temperature, Density, Magnetic fields, Polarication, Discharge tubes, Mercury, Tensor analysis, Boundary layer, Moments.

The work is concerned with the resonant motion exhibited by a plasma column which is excited by an oscillating electric field transverse to the column. A theory is considered which includes the effects of electron temperature and of nonuniformities in the plasma electron density. The theory yields a fourth order differential equation which is integrated numerically to find the predicted resonant frequencies. It is concluded that the nonuniform electron density plays a crucial role in determining the resonant frequencies. The effect of an axial magnetic field upon the resonances was investigated. It is shown that the field causes each resonance to split into a right and left circularly polarized resonance whose frequencies depend on the field strength. These preliminary calculations were checked with experiment and they give good qualitative agreement. Possible diagnostic uses of these results are considered. (Author)

AD-603 553 Div. 25
OTS Prices: HC $3.00/MF $0.75

National Co., Inc., Malden, Mass.
INVESTIGATION OF MULTIPLE SPIN FLIP PROCESSES TO PRODUCE TRANSITIONS AND INVERSIONS AT ARBITRARY FREQUENCIES.
Final rept.,
by George W. Myers. 16 Mar 64, 75p
Contract AF19 628 456, Proj. 4645, Task 464501
AFCRL 64 243

Unclassified report

Descriptors: (*Masers, Semiconductor devices), (*Semiconductor devices, Masers), Electron transitions, Electrons, Nuclear spins, Nuclear magnetic resonance, Relaxation time, Silicon, Boron, Phosphorus, Spectrum analyzers, Microwaves, Cavity resonators, Equations, Impurities.

The rate equations governing the operation of a six-level maser utilizing cross relaxations between the three pairs of spin levels in phosphorous-boron doped silicon are derived. Excess populations are obtained under the assumption that the longitudinal relaxation time for electrons in boron states is much shorter than that for electrons in phosphorous states, in terms of a cross relaxation time tau sub x and the longitudinal times tau sub 1. Dependence of tau sub x on concentrations, and minimal conditions for inversion, are established. The criteria for the design and operation of a dual-mode spectrometer to be used (1) to measure tau sub x and (2) as a maser, are established in terms of microwave parameters and spin system-crystal parameters. Estimates of the operating values are made by taking reasonable values for the parameters. The final design and operation of the spectrometer is described. The effects of cavity loading are estimated in terms of the cavity mode and crystal lossiness, and are compared to the experimental practice. Sensitivity of the spectrometer and experimental results are given. (Author)

AD-603 556 Div. 25
OTS Prices: HC $2.00/MF $0.50

Uppsala Univ. (Sweden).
REDUCTION OF KRONECKER PRODUCTS OF SPACE GROUP REPRESENTATIONS IN THE FRAME-WORK OF LITTLE GROUP THEORY.
Scientific rept. no. 11,
by I. V. V. Raghavacharyulu. 1 Apr 64, 28p
Contract AF61 052 701,
ARL 64 183

Unclassified report

Descriptors: (*Crystal lattices, Field theory), (*Symmetry (Crystallography), Field theory), Vector analysis, Wave functions, Crystals, Vibration, Selection rules, Matrix algebra, Sweden.

A general method for the reduction of the represention of space groups is discussed, making use of their allowable representations. Given any representation this method depends on finding some appropriate representations of suitable groups of wave vectors of the space group which are then decomposed into different allowable representations of them. As the irreducible representations of the space group are uniquely defined by its allowable representations, by this procedure the complete reduction of the given representation is effected. This method is first applied, for orientation to the analysis of reality condition and compatibility relations of space group irreducible representations and the symmetry modes of vibrations of crystals. Then it is extended to the reduction of the Kronecker products, both ordinary and symmetric, of the irreducible representations of space groups. As the final reduction is accomplished with respect to the groups of wave vectors this method fits in the frame work of the little group technique. (Author)

AD-603 557 Div. 25, 13, 15, 30
OTS Prices: HC $1.00/MF $0.50

Stanford Univ., Calif. Div. of Engineering Mechanics.
SOME RECENT DEVELOPMENTS IN LINEAR VISCOELASTIC STRESS ANALYSIS.
Rept. no. 5,
by E. H. Lee. Jun 64, 22p SUDEM-150
Contract Nonr225 69

Unclassified report

Descriptors: (*Viscoelasticity, Mathematical analysis), (*Mathematical analysis, Stresses), Plastics, Polymers, Mechanical properties, Thermal properties, Linear systems, Boundary value problems, Operators (Mathematics).

The simple viscoelastic models associated with the names Maxwell, Kelvin and 'standard linear solid,' and generalizations limited to model representation with a few elements, or equivalently low order differential operator representations, commonly do not express real material behavior satisfactorily. Recent work in the United States in linear viscoelastic stress analysis has emphasized formulation of the theory and methods of so lution for general linear material behavior. The structure of the theory is considered, and also approaches to various types of boundary value problems, including, for example, moving boundaries and mixed type boundary conditions, which prevent the direct use of transform methods. Discussion is also included of the influence of temperature variation on the basis of thermo-rheologically simple material response. (Author)

25. Physics

AD-603 523 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Elcon Lab., Inc., Peabody, Mass.
INTERACTION OF ELECTROMAGNETIC WAVES AND CLASSICAL PLASMAS.
Monthly rept. no. 11,
by Robert Siegel. 15 May 64, 8p ELI-R-5-64-1
Contract AF33 657 11671

Unclassified report

Descriptors: (*Plasma medium, Electromagnetic waves), (*Microwaves, Plasma physics), Signals, Propagation, Probes (Electromagnetic), Crossed field devices, Kinetic theory, Electrical conductance.

In subsequent works, special emphasis was given to the physical interpretation of the mathematical expressions, and to the consequent formulation of more experimentally meaningful equations. Also, a generalization of the theory to the presence of three signals was made.

AD-603 526 Div. 25, 8, 30
OTS Prices: HC $1.00/MF $0.50

Westinghouse Electric Corp., Elmira, N. Y.
APPLICATION OF LIGHT AND IMAGE INTENSIFICATION.
Monthly technical engineering rept. no. 6, 1-31 Dec 63,
by Z. Szepesi and W. A. Thornton. 13 Jan 63, 7p
Contract N61339 1440

Unclassified report

Descriptors: (*Image intensifiers (Electronics), Semiconductor devices), (*Semiconductor devices, Image intensifiers (Electronics)), (*Light, Intensity), Semiconducting films, Thin films (Storage devices), Evaporation, Photoconductivity, Cadmium compounds, Selenides, Powders, Spectroscopy, Sintering, Mathematical programming, Programming (Computers).

Formulas were derived for the contrast (gamma) of the image intensifier and calculated on the computer. Spectral analysis of high purity CdSe powder of different origin was made. Different baking schedules for doping the powder resulted in more sensitive and more homogeneous layers. These powders gave fairly good sensitivities in plastic embedment too, where no further high temperature baking is necessary. Several image intensifier panels were built both with sintered and plastic embedded PC layers. Work was started on the constructing of the high resolution image intensifier, using evaporated EL films. Work on the preparation of evaporated EL films was continued. Iodine and gallium coactivators were used beside chlorine. Neither brightness, nor efficiency showed and dependence on the coactivators. Life testing of these films is being planned. (Author)

AD-603 530 Div. 25
OTS Prices: HC $1.00/MF $0.50

Rochester Univ., N. Y.
THEORETICAL STUDIES OF THE ELECTROMAGNETIC FIELD IN THE FOCAL REGION OF COHERENT LIGHT BEAMS.
Progress rept. no. 3, 1 Oct 63-31 Mar 64,
by Emil Wolf. 31 Mar 64, 7p
Grant DA ARO D31 124G325

Unclassified report

Descriptors: (*Beams (Electromagnetic), Electromagnetic fields), (*Electromagnetic fields, Beams (Electromagnetic)), Lasers, Theory, Optical equipment, Electromagnetic waves, Diffraction, Photons, Density, Field theory, Quantum mechanics, Quantum statistics, Dynamics, Light transmission, Optics, Scientific research.

Research covered in this report includes: (a) Electromagnetic diffraction in the focal region of an aplanatic optical system. (b) Fluctuations of light beams. (c) Phase space formulation of the dynamics of canonical variables.

AD-603 531 Div. 25, 9
OTS Prices: HC $3.00/MF $0.50

Weidlinger (Paul), New York.
SOUND RADIATION FROM SUBMERGED CYLINDRICAL SHELLS OF FINITE LENGTH.
Technical rept. no. 3,
by John M. McCormick and Melvin L. Baron. Jun 64, 57p
Contract Nonr3454 00, Proj. NR064 464

Unclassified report

Descriptors: (*Cylindrical bodies, Acoustics), (*Acoustics, Cylindrical bodies), Sound, Elastic shells, Fluids, Hydrostatic pressure, Vibrations, Viscosity, Damping, Simultaneous equations, Integral equations, Fluid mechanics.

The paper deals with the case of the axisymmetrical (n=0) forced vibrations of a thin cylindrical shell of finite length submerged in an acoustic fluid. Numerical results are given for several structural models which may later be utilized to obtain test results. The superposition of the pressure fields obtained from the band excitations may be used to evaluate the pressure fields in the fluid which are produced by harmonic point loadings on the shell, or by loadings over small finite areas of the structure. Such results will be utilized to attempt the prediction of sound fields for a series of tests on thin elastic cylindrical shell models of finite length.

AD-603 533 Div. 25
OTS Prices: HC $5.00/MF $1.00

California Inst. of Tech., Pasadena.
EXPERIMENTAL STUDY OF PLASMA WAVE RESONANCES IN A HOT NONUNIFORM PLASMA COLUMN.
Technical rept. no. 22,
by John C. Nickel. May 64, 168p
Contract Nonr220 50

Unclassified report

Descriptors: (*Plasma oscillations, Resonance), Discharge tubes, Mercury, Spectroscopy, Magnetic fields, Density, Potential theory, Waveguides, Electromagnetic pulses, Moments.

The paper presents observations of both dipole and quadrupole resonance spectra made on several discharge tubes with column radii ranging from 0.30 to 0.87 cm. For these measurements the value column radius/Deby length varies from about 1000 to 1000000, and the best fit electron temperatures are found to be of the order of 3 ev. The average electron densities were directly measured using a cavity perturbation technique. The results of these observations were found to be in good agreement with the theory based upon the first two moments of the correlationless Boltzmann equation in conjunction with Parker's electron density profile for a low density positive column. The results of a preliminary investigation of the effects of an axial, static magnetic field on the dipole resonance spectrum are also presented. These results indicate that in the

A GEOMETRIC STUDY OF COHERENCE PROPERTIES OF PARTIALLY POLARIZED ELECTROMAGNETIC RADIATION.
Physical Sciences Research Paper,
by E. Folke Bolinder. Jun 64, 25p
Proj. 5635
AFCRL 64 460; AFCRL PSRP24

Unclassified report

Descriptors: (*Electromagnetic waves, Polarization), (*Geometry, Optics), Optical properties, Matrix algebra, Mathematical models, Correlation techniques, Transformations (Mathematics).

The well-known analytic theory of partially polarized electromagnetic waves is complemented with a geometric theory. In the geometric theory the components of the 2 X 2 coherence matrix of a partially polarized plane wave and the Stokes parameters of the wave are treated in two four-dimensional spaces. From the first four-dimensional space a three-dimensional space is derived which constitutes a Poincare model of three-dimensional (non-Euclidean) hyperbolic space having a plane, the polarization ratio plane, as the fundamental surface. This model can also be obtained by a generalization to three dimensions of an elementary inversion method called the Isometric Circle Method in the polarization ratio plane. A cross section through the second four-dimensional space, which is a Minkowski model of Lorentz space, yields the Cayley-Klein model of three-dimensional hyperbolic space having the unit sphere, in optics called the Poincare sphere, as fundamental surface. Invariant properties of partially polarized waves are studied by means of the different models. So, for example, transformations of the complex degree of correlation mu and the degree of polarization P (defined as the ratio of the polarized intensity and the total intensity) are studied in the Poincare and Cayley-Klein models by means of simple geometric constructions which lucidly show the relationships between the degree of correlation and the degree of polarization. (Author)

AD-603 593 Div. 25
OTS Prices: HC $4.00/MF $0.75

Air Force Cambridge Research Labs., Bedford, Mass.
FERRIMAGNETIC RESONANCE RELATIONS FOR MAGNETOCRYSTALLINE ANISOTROPY IN CUBIC CRYSTALS.
Special rept. (Master's thesis),
by Hans Roland Zapp. Apr 64, 104p
Proj. 5621
AFCRL 64 72; AFCRL SR2

Unclassified report

Descriptors: (*Ferromagnetic materials, Magnetic resonance), (*Crystals, Anisotropy), Equations, Symmetry (Crystallography), Ferrites, Garnet, Yttrium compounds, Iron compounds, Gallium compounds, Indium compounds, Thermodynamics.

A general resonance equation which directly relates the resonance frequency to the static applied field and internal anisotropy field for cubic ferrimagnets was derived. The equation is valid for an infinite number of planes which contain the 110 direction. The limitations and difficulties of other approaches outlined in the literature are mentioned. The advantages and disadvantages of the derivation contained in this thesis are explained. Certain interesting features of the resonance relationship are mentioned. The theoretical calculations give very close agreement to the experimental observations on yttrium iron garnet (YIG), as well as gallium- and indium-substituted YIG's. The theoretical calculations, however, increasingly deviate from experimental results as the internal anisotropy fields increase. The validity of Wojtowicz's remarks concerning the inaccuracy, incompleteness, and confusion of the literature is investigated. (Author)

AD-603 594 Div. 25
OTS Prices: HC $3.00/MF $0.75

Air Force Cambridge Research Labs., Bedford, Mass.
A STUDY OF TRANSVERSE MODES OF RUBY LASERS USING BEAT FREQUENCY DETECTION AND FAST PHOTOGRAPHY.
Physical sciences research paper (Doctoral thesis),
by C. Martin Stickley. May 64, 88p
Proj. 4645
AFCRL 64 434; AFCRL PSRP19

Unclassified report

Descriptors: (*Lasers, Oscillation), Ruby, Optical properties, Resonators, Mirrors, High-speed photography.

Intensity variations in the frequency range of 6 to 141 Mcps were detected in the output of ruby lasers. These are interpreted to be beats between simultaneously occurring transverse modes with the same axial mode number, rather than beats between two modes in regions of the ruby rod having slightly different path lengths. Evidence for this interpretation was provided primarily by two experiments: (1) the beats disappeared when the ruby laser rod was operated with small mirrors, and (2) streak photographs of a narrow strip of the end of the rod always showed a phase variation across the rod of the beat frequency. Extensive measurements of a ruby rod whose path length variations were approximately lamboa/10 showed that the transverse modes and beat frequencies were characteristic of a nonconfocal resonator rather than a plane-parallel resonator. The probability of observing transverse mode beats increases as the temperature is lowered and as the pump energy is increased. It is possible to excite only one transverse mode per axial mode number at room temperature and at pump energies 20% over threshold. Thus single frequency operation of ruby lasers is possible if axial mode selection is used. (Author)

AD-603 600 Div. 25
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
CALCULATION OF THE RADIAL EMISSION COEFFICIENT AND RADIAL TEMPERATURE PROFILES OF A CYLINDRICALLY SYMMETRIC OPTICALLY THICK PLASMA.
Master's thesis,
by Thomas Fowler Jerrick. May 64, 90p
AFIT GSP/Phys/64 7

Unclassified report

Descriptors: (*Plasma media, Emissivity), Iterative methods, Polynomials, Errors, Numerical analysis, Functions, Programming (Computers), Temperature.

An iteration method for obtaining the spectral emission coefficient of a cylindrically symmetric, optically thick plasma as a function of radius from the equation relating the emission coefficient to the observed, edge-on intensity profile of the plasma was developed. The method is valid for a wide range of total absorptivity of the plasma ($0 < \alpha < 0.70$). The method requires representing the experimental data by polynomials, and the solution is also in the form of a polynomial. The spectral absorption coefficient is also determined, and the radial temperature profile of the plasma calculated from Kirchhoff's law. A computer program was written to perform all necessary numerical calculations. The accuracy of the method is limited by the accuracy of the representation of the experimental data. (Author)

AD-603 565 Div. 25
OTS Prices: HC $2.00/MF $0.50

Stanford Univ., Calif. Div. of Engineering Mechanics.
SUPERPOSED DEFORMATIONS IN NONLINEAR VISCOELASTICITY.
Rept., no. 4,
by E. J. Appleby and E. H. Lee. Jun 64, 39p
SUDEM-149
Contract Nonr225 69

Unclassified report

Descriptors: (*Viscoelasticity, Theory), Deformation, Nonlinear systems, Stresses, Mathematical analysis, Loading (Mechanics), Functions.

A short review is given of the Green-Rivlin theory of nonlinear materials with memory. Small viscoelastic deformation following instantaneous finite elastic response is analysed by linearization of the added viscoelastic deformation. Incompressible, initially isotropic materials are considered. Such an approach can simplify the analysis of the technologically important problem of stress analysis following sudden loading, which does not fall within the scope of the more common perturbation about a steady or equilibrium strain configuration. The method is applied to the problem of simple tension of a nonlinear viscoelastic rod. It is then shown how the material behavior, in the form of the kernel functions of the linearized constitutive equation, may be determined by a series of two-step simple relaxation tests. (Author)

AD-603 568 Div. 25
OTS Prices: HC $1.00/MF $0.50

Brown Univ., Providence, R. I. Div. of Applied Mathematics.
THE MECHANICS OF MATERIALS WITH STRUCTURE.
Technical rept. no. 94,
by A. E. Green and R. S. Rivlin. Jul 64, 18p
Contract Nonr562 10, Proj. NR064 406

Unclassified report

Descriptors: (*Continuum mechanics, Deformation), Force (Mechanics), Field theory, Mechanical properties, Tensor analysis, Vector analysis, Particles, Energy, Elasticity, Mathematical analysis, Materials, Solids.

It is the object of the paper to draw attention to the manner in which the methods of classical continuum mechanics may be extended to render them applicable to systems and situations which heretofore were outside the range of continuum mechanics.

AD-603 575 Div. 25, 2
OTS Prices: HC $1.00/MF $0.50

Aeronautical Research Inst. of Sweden, Stokholm.
SONIC-BOOM WAVES IN STRONG WINDS,
by Robert F. Dressler. Oct 63, 23p FFA-97

Unclassified report

Descriptors: (*Sonic boom Propagation), Acoustics, Atmosphere models, Wind, Atmospheric temperatures, Equations, Programming (Computers), Jet plane noise, Sound transmission, Mathematical prediction.

Variable atmospheric conditions of winds and temperatures can cause a wide scatter about average values of sonic-boom intensities at ground level. This is analyzed quantitatively for a common atmospheric model: wind velocity increasing linearly with altitude, constant wind direction, and linear temperature variation (the Project Big Boom model). Winds introduce non-isotropy and convection into acoustic propagation, modifying simple geometrical acoustic theory so that rays no longer remain orthogonal to wavefronts. A brief survey is sketched of generalized geometrical acoustics derived from weak-shock theory, with quadratic wave-normal surfaces, the generalized Eiconal equation, and associated six Hamiltonian equations for rays and wave normals. Previous sonic-boom calculations with winds have not used this exact formulation, employing instead an approximation, due to Rayleigh, valid for small ray angles and small wind velocities, which is commonly applied to atomic blast calculations. A computer program was developed which solves each sonic-boom propagation pattern for arbitrary wind and temperature distribution in less than a half-minute. Results on the PBB model for five wind directions show that the variations from headwind to tailwind are almost 5:1 for energy intensity, and 2.2:1 for overpressures. Energy intensity absorbed by the horizontal surface, however, remains constant for this model. A suggestion is therefore made that the customary reliance upon only one quantity (overpressure measurement) is insufficient for proper assessment of sonic-boom nuisance and damage. Present results differ considerably from previous results on the same model which used the Rayleigh approximation, indicating that the simplified theory may be generally inadequate for sonic-boom predictions. (Author)

AD-603 584 Div. 25, 30
OTS Prices: HC $3.00/MF $0.75

Owens-Illinois Technical Center, Toledo, Ohio.
RESEARCH IN HIGH-TEMPERATURE X-RAY DIFFRACTION TECHNOLOGY.
Final rept. for 1 Jul 60-31 Dec 63,
by S. M. Lang and E. W. Franklin. May 64, 94p
Contract AF33 616 7470, Proj. 7022, Task 702202
ARL 64 82

Unclassified report

Descriptors: (*High-temperature research, X-ray diffraction analysis), (*X-ray diffraction analysis, High-temperature research), Goniometers, Induction heating, Thermocouples, Zirconium compounds, Dioxides, Platinum, Beryllium compounds, Oxides, Crystallography, Hysteresis, Mathematical analysis.

High accuracy (0.005 degree 2-theta) and high precision (0.002 degree 2-theta) for x-ray diffraction measurements at angles from less than zero to 155-160 degrees 2-theta at sample temperatures to 2600-2800C in oxidizing, neutral, reducing, or evacuated atmospheric environments are characteristics of a high-temperature x-ray diffractometer system specifically designed for research studies. Within the noble-metal thermocouple temperature range, very rapid thermal equilibrium -- 500C intervals in less than 3 seconds -- can be attained. The crystallometry of zirconium dioxide, ZrO2, has been surveyed in the range from room temperature to 1750C in normal air atmosphere at ambient pressure. Topics studied in some detail have been (a) the hysteresis of the monoclinic-tetragonal zirconia transformation, (b) the axial thermal expansion of tetragonal zirconia to 1750C, (c) the determination of axial expansion data for platinum and beryllium oxide for use as sample temperature indicators, and (d) new mathematical solutions of the classical d-value equations for lattice constants calculations. It has been shown that significant physical properties and constants can be measured for ZrO2 if the oxygen stoichiometry is established and maintained at an (unknown) equilibrium, or pseudo-equilibrium, value. (Author)

AD-603 588 Div. 25, 15
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.

(*Semiconductors, Acoustic properties), (*Piezoelectric crystals, Electrical properties), (*Cadmium compounds, Sulfides), Crystals, Lithium, Sodium, Crystal growth, Electrons, Drift, Hall effect, Gain, Attenuation, Measurement, Conductivity, Delay lines, Pulse amplifiers, Amplifiers.

The acoustic amplification, drift mobility and Hall mobility were measured in thirteen cadmium sulfide crystals to determine the effect of impurities on these properties. Ten of the measured crystals were grown doped with lithium, sodium or a combination of both sodium and lithium and three crystals were grown undoped. The undoped crystals have a maximum acoustic gain of about 70 db/cm, a Hall mobility of 170 sq cm/volt-sec and a drift mobility of 160 sq cm/volt-sec. The lithium doped crystals have a maximum gain of about 100 db/cm, a Hall mobility of 300 sq cm/volt-sec and a drift mobility of 100 sq cm/volt-sec. The sodium doped crystals have a maximum gain of 3 db/cm, a Hall mobility 100 sq cm/volt-sec and a drift mobility of 50 sq cm/volt-sec. The sodium-plus-lithium doped crystals have a maximum gain of about 25 db/cm, a Hall mobility of 200 sq cm/volt-sec and a drift mobility of 150 sq cm/volt-sec. The measurements indicate that impurities in the crystal can either increase or reduce the acoustic amplification and impurities increase electron trapping within the crystal, thus reducing the drift mobility. (Author)

AD-603 613 Div. 25, 7, 8
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
INVESTIGATION OF A LASER TRIGGERED SPARK GAP.
Master's thesis,
by Winston K. Pendleton. Aug 64, 117p
AFIT GNE/Phys/64 13

Unclassified report

Descriptors: (*Lasers, Electronic switches), (*Electric discharges, Production), (*Ionization, Lasers), Gas discharges, Gas ionization, Electric fields, Photoelectric effect, Space charges, Ionic current, Measurement, Electric arcs, Photons, Beams (Electromagnetic), Sparks, Theory, Ruby.

A focused, Q-spoiled laser beam was used to produce an arc in a sphere-sphere electrical gap charged to within 30-90% of self breakdown. The time response of the triggering was measured as a function of: laser beam power, 0-80 megawatts; fill gas, SF6, N2, Air; gas pressure, 100-1400 mm of Hg; electrode spacing, .4-1.5 cm; gap electric field, 10-100 KV/cm and focus point location. Short delay times as low as 20 ns were measured in SF6 at atmospheric pressure. Generally delay times varied inversely with the electric field, gas pressure and focus point distance from the anode surface. The results obtained were considered consistent with those predicted by the streamer theory of arc formation. (Author)

AD-603 616 Div. 25
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A METHOD FOR GENERATING A CYLINDRICAL HOMOGENOUS MAGNETIC FIELD VOLUME.
Master's thesis,
by David Eugene McIntyre. Jun 64, 75p
AFIT GSP/Phys 64 10

Unclassified report

Descriptors: (*Magnetic fields, Synthesis), Coils, Solenoids, Magetism, Theory, Integral equations, Numerical analysis, Programming (Computers).

The synthesis of a uniform magnetic field along the axis of a system of coaxial coils and solenoids is discussed. Both ideal (thin) and real (thick) sources are treated. A field of specified constant intensity throughout some system length is synthesized by varying the turn density on solenoids and the position of Helmholtz-like coils subject to constraints imposed by access spaces. Given the axial field to be generated and the interval which is to be accessible, an integral equation is derived which the turn density must satisfy. The integral equation is a Fredholm equation of the first kind. Analytic solution of the equation by standard techniques fails. Methods of numerical solution are used to obtain the turn density. The resulting computer programs are easily adaptable for the numerical solution of any Fredholm integral equation of the first kind. (Author)

AD-603 619 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
STATISTICAL DESCRIPTIONS OF FREE BOSON FIELDS,
by Dennis Holliday. Aug 64, 21p RM-4103-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Bosons, Quantum statistics), (*Quantum statistics, Bosons), (*Beams (Electromagnetic), Field theory), (*Stochastic processes, Light), Quantum mechanics, Statistical functions, Probability, Matrix algebra, Functional analysis.

Two new methods of describing statistical light beams have recently been published. Glauber has introduced the P-representation of boson field density matrices, and Sudarshan has developed a probability functional approach which is claimed to imply an equivalence between the classical and quantum mechanical descriptions of statistical light beams. This note demonstrates that using conventional stochastic process methods in the Heisenberg picture to describe a light beam produced by a statistical ensemble of classical (c-number) sources is equivalent to representing the statistical state of the light beam by a density matrix having a P-representation. The relation between the classical and quantum statistical descriptions implied by Sudarshan's probability functional approach is shown to be purely formal and without physical meaning. Sudarshan's statement that the probability functional method can be used to prove that all the correlation functions of the beam determine its density matrix is demonstrated to be incorrect. (Author)

AD-603 623 Div. 25
OTS Prices: HC $2.00/MF $0.50

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
CRYOPUMPING CAPTURE COEFFICIENTS OF TWO NITROGEN-OXYGEN GAS MIXTURES,
by J. P. Dawson. Aug 64, 35p
Contract AF40 600 1000, Proj. 8951, Task 895104
AEDC TDR64 150

Unclassified report

Descriptors: (*Cryopumping, Mathematical models), (*Oxygen, Cryopumping), (*Nitrogen, Cryopumping), Liquefied gases, Mixtures, Vacuum pumps, Velocity.

The experimental investigation of two nitrogen-oxygen mixtures is presented, and the results are interpreted by the critical velocity model. A direct comparison of the capture coefficients calculated from this model is made with the capture coefficients calculated assuming that the gases behave as ideal gases. (Author)

AD-603 602 Div. 25
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
CHARGED PARTICLE MOTION IN AN INHOMOGENEOUS MAGNETIC FIELD.
Master's thesis,
by Dalton N. Wirtanen. Aug 64, 113p
AFIT GSP/Phys 64 15

Unclassified report

Descriptors: (*Plasma media, Charged particles), (*Charged particles, Magnetic fields), Magnetic pinch, Injection, Particle trajectories, Statistical distributions, Statistical functions, Theory, Probability.

The theory necessary to specify a distribution function for charged particles in an inhomogeneous magnetic field was developed. A transfer function is used to define the probability that particles will go from a given state A to a state B in a characteristic distance traveled. The equations of motion for the particles have been derived in order to evaluate the moments of the transfer function. The magnetic field due to two specific magnetic traps is calculated. The first trap is formed by superimposing a transverse field, due to a number of infinite straight current carrying rods, upon a uniform axially-symmetric field. The second trap is of the same form but of finite length with axial magnetic mirrors at each end (Ioffe Bottle). The motion of the charged particles in the infinite conductor configuration was numerically calculated. In the magnetic trap, there seems to be a tendency for the particles with particular injection parameters to escape radially. Other injection parameters tend to result in the containment of the particles. (Author)

AD-603 604 Div. 25
OTS Prices: HC $4.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
HOMOGENEITY OF CADMIUM SELENIDE-CADMIUM SULFIDE SOLID SOLUTIONS BY X-RAY FLUORESCENCE.
Master's thesis,
by Donald Arthur Brooks. Aug 64, 135p
AFIT gne/phys/64 4

Unclassified report

Descriptors: (*Cadmium compounds, Fluorescence), (*Solid solutions, Cadmium compounds), Selenides, Sulfides, Single crystals, X-ray spectroscopy, Crystal growth, Semiconductors.

The homogeneity of cadmium selenide-cadmium sulfide solid solutions was investigated by the x-ray fluorescence method. Both 'as grown' or assumed homogeneous crystals and purposely manufactured non-homogeneous crystals were used. It was concluded from the x-ray fluorescence analysis of standards that any results within 3% of each other were due to statistical variations, but results with deviations greater than 3% were due to the composition change within the crystal. The homogeneity of four assumed homogeneous and four non-homogeneous crystals was examined by scanning the crystals with stationary collimators of small aperture. The assumed homogeneous crystals showed results within 3% therefore they were considered homogeneous, but the purposely manufactured non-homogeneous crystals were found to be truely non-homogeneous. (Author)

AD-603 606 Div. 25, 20
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
LENGTH CHANGE MEASUREMENTS OF ELECTRON-IRRADIATED CADMIUM SULFIDE.
Master's thesis,
by Ronald Lawrence Bellows. Aug 64, 93p
AFIT GNE/Phys/64 1

Unclassified report

Descriptors: (*Cadmium compounds, Radiation damage), (*Sulfides, Radiation damage), (*Radiation damage, Single crystals), Crystal lattice defects, Crystal structure, Electron bombardment, Physical properties, Electron accelerators.

The relationship between radiation damage in a 'thin' platelet, high purity, single-crystal cadmium sulfide crystal and the change in the physical dimensions of the crystal was investigated. The sample was irradiated in a vacuum at 77K and 300K by a 150 keV electron beam just above the beam displacement threshold for the sulfur atom of 115 keV. The shrinkage and its ultimate saturation suggest the diffusion of sulfur interstitials from the crystal with an accompanying accumulation of sulfur vacancies in the lattice. The difference in the results at 77K and at 300K indicate an annealing of the damage somewhere between the two temperatures. (Author)

AD-603 607 Div. 25, 15
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
NUMERICAL SOLUTION OF THE PERTURBED HARMONIC OSCILLATOR EQUATION AND THE HARTREE-FOCK MANY-ELECTRON EQUATIONS BY USE OF GREEN'S FUNCTION.
Master's thesis,
by Donald Richard Lehman. Aug 64, 103p
AFIT GSP/Phys/64 9

Unclassified report

Descriptors: (*Integral equations, Numerical analysis), (*Harmonic oscillators, Quantum mechanics), (*Green's function, Differential equations), Equations, Motion, N-body problem, Electrons, Perturbation theory, Operators (Mathematics), Iterative methods, Integration, Atomic structure, Hydrogen, Helium, Beryllium, Atomic orbitals.

The numerical solution of the perturbed harmonic oscillator equation and the Hartree-Fock equations by use of Green's Function was demonstrated to be a powerful method. The given quantum mechanical differential equation is transformed into an integral equation by means of Green's Function. Even if the integral equation is nonlinear or has an unsymmetric kernel, or both, the integral equation is easily solved numerically by an iterative scheme. When the integral equation is linear and has a symmetric kernel, the integral equation may be solved for the unknown eigenvalues and eigenfunctions by diagonalization of the kernel by the method of Jacobi. The boundary conditions of the physical problem are built into the integral equation by the Green's Function, and need not be forced during the iteration scheme as in the method of Numerov.

AD-603 611 Div. 25
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ACOUSTIC AMPLIFICATION AND ELECTRON MOBILITY IN LITHIUM AND SODIUM DOPED CADMIUM SULFIDE.
Master's thesis,
by John Allen Hubbard. Jun 64, 82p
AFIT GNE/Phys/64 11

Unclassified report

Descriptors: (*Impurities, Semiconductors),

The investigation was concerned with the direct conversion of fluid dynamic energy into electrical energy. The objectives were to experimentally observe the effect upon the performance of the process when colloids (condensation droplets) are used as the charge carriers and to determine theoretically the mobility of the charged droplets. Tests were made using water and carbon tetrachloride vapors and three initial pressures: 90 psia, 180 psia, and 270 psia. Test results show that the current and power outputs of the experimental generator are greatly increased when colloids rather than ions are used as the charge carriers. Observed current increases are about a factor 4 and power increases about one order of magnitude. Better results were obtained when water vapor was used. Carbon tetrachloride vapor proved to be very effective for the suppression of the corona discharge process.

AD-603 682 Div. 25
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN INVESTIGATION OF THE POSSIBILITY OF ELECTRICALLY ATOMIZING VOLATILE LIQUIDS.
Master's thesis,
by Gary Culp. Aug 64, 103p
AFIT GSP/Phys/64 1

Unclassified report

Descriptors: (*Atomization, Electrostatics), (*Water, Atomization), (*Nitrogen, Atomization), Liquids, Liquefied gases, Ionization, Sulfuric acid, Sprays, Electric fields, Capillary tubes, Vacuum systems, Charged particles, Hypersonic wind tunnels, Electric propulsion.

Several volatile liquids were investigated to determine if they could be atomized electrically. Liquids studied included distilled water, ionically doped water (H_2SO_4 in H_2O), and liquid nitrogen. The liquids were forced under pressure through small metal capillary tubes held at high positive potentials with respect to a nearby ground plate. Liquid nitrogen was studied at atmospheric pressure and in vacuo; water was investigated only in vacuo. Particles sprayed from the capillary tubes were monitored with charged particle detectors to measure any net electrical charge. Resulting sprayed particles in all cases had net charge insufficient to be detected above background noise. The lack of charge on the sprayed particles can be explained by analysis of the key times required for ion separation in the liquid versus the time the ions spend in the electric field (a study of liquid velocity versus ion mobility). Limitations of volatile liquids sprayed at near atmospheric pressures are not so severe; under certain conditions the liquids examined might be electrically sprayed in a controlled manner. (Author)

AD-603 685 Div. 25
OTS Prices: HC $3.00/MF $0.50

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
DETERMINATION OF THE TEMPERATURE PROFILE OF AN OPTICALLY THICK CYLINDRICALLY SYMMETRIC LABORATORY PLASMA.
Master's thesis,
by Paul W. Elder. May 64, 52p
AFIT GSP/Phys/64 3

Unclassified report

Descriptors: (*Plasma medium, Temperature), (*Spectroscopy, Plasma physics), Emissivity, Absorption spectrum, Thickness, Optical properties, Theory, Optical equipment.

The temperature profile of a self-absorbing radially symmetric cylindrical laboratory plasma was experimentally determined using a spectroradiometric technique. The technique involves the measurement of the ratio of the spectral radiant emittance of the plasma gas to its spectral absorptivity which, according to Kirchhoff's law, is equal to the spectral radiant emittance of a black body at the same temperature and wavelength. The method does not depend on knowledge of the transition probabilities or number densities of the gas under study, or even its composition, and it is valid whenever departures from local thermal equilibrium in the plasma are small. (Author)

AD-603 692 Div. 25
OTS Prices: HC $3.00/MF $0.75

Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
TOROIDAL SHELLS UNDER INTERNAL PRESSURE IN THE TRANSITION RANGE.
Technical rept. no. 19,
by John N. Rossettos and J. Lyell Sanders, Jr. Jun 64, 75p
Contract Nonr1866 02

Unclassified report

Descriptors: (*Structural shells, Deformation), Pressure, Membranes, Nonlinear Systems, Integration, Differential equations, Numerical analysis, Functions.

For the circular toroidal shell under internal pressure, the solution of the linear membrane equations does not yield continuous displacements. This difficulty can be resolved by the use of either linear bending or nonlinear membrane theory when they apply. An analytic solution is found in a transition range where both bending and nonlinear membrane action must be considered simultaneously. The governing equations are reduced to two simultaneous equations each containing a large parameter. Methods of asymptotic integration are then used, and the problem is finally reduced to solving four sets of two simultaneous, second order, linear differential equations whose solution depends on a transition parameter. These equations are solved numerically for various values of the transition parameter, and the resulting functions can be used to solve the problem for practical values of parameters in the transition range without the further need of a computer. (Author)

AD-603 693 Div. 25
OTS Prices: HC $3.00/MF $0.75

Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
THE EFFECT OF A RIVETED STRINGER ON THE STRESS IN A SHEET WITH A CRACK OR A CUTOUT.
Technical rept. no. 20,
by Joseph M. Bloom. Jun 64, 70p
Contract Nonr1866 02

Unclassified report

Descriptors: (*Structural parts, Stresses), (*Riveted joints, Stresses), Sheets, Beams (Structural), Loading (Mechanics), Fracture (Mechanics), Tensile properties.

The report is concerned with a theoretical investigation into the effect of a rivet-attached stringer on the stress concentrations in a thin elastic sheet with a crack or a cutout. The sheet and stringer are loaded (at infinity) by a uniform tensile stress parallel to the stringer. The sheet contains a finite crack perpendicular to the stringer. The effect of the stringer on the stress concentration due to a circular cutout is also investigated. The problem is formulated in terms of an infinite set of algebraic equations for the unknown rivet loads which are truncated and then solved on the IBM 7094 digital

AD-603 649 Div. 25
OTS Prices: HC $5.00/MF $1.00

Cruf Lab., Harvard Univ., Cambridge, Mass.
MICROWAVE-OPTICAL EXPERIMENTS AND PSEUDO-STARK EFFECT IN RUBY,
by Martin Gilbert Cohen. 5 Feb 64, 156p, Cruft-TR-437
Contracts Nonr1866 16, SD88, Proj. NR372 012
Unclassified report

Descriptors: (*Lasers, Ruby), (*Ruby, Lasers), (*Absorption spectrum, Line spectrum), Microwaves, Resonance absorption, Atomic energy levels, Crystal lattices, Ions, Field theory, Electric fields, Optical properties, Chromium, Aluminum compounds, Oxides, Crystals, Magnetic fields.

A quantitative investigation of the absorption among the Zeeman components of the R-and B-lines was undertaken. A study was made on the optical detection of the microwave resonances in the ground state. These experiments have now been carried out and are reported on here. The effect of an applied electric field on the R-lines was measured. The influence of an electric field on the B-lines was observed and the results are presented.

AD-603 651 Div. 25
OTS Prices: HC $3.00/MF $0.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
INJECTION LASER STUDY.
Quarterly technical rept. no. 4, 1 Mar-31 May 64,
by W. P. Dumke, F. Stern, and K. Weiser.
31 May 64, 52p
Contract DA36 039AMC02349E, Proj. 1P622001A056
Unclassified report

Descriptors: (*Diodes (Semiconductor), Lasers), (*Lasers, Arsenic alloys), (*Semiconductor devices, Lasers), Gallium alloys, Manganese, Zinc, Diffusion, Electrical impedance, Models (Simulations).

A new method for fabricating GaAs laser diodes with P-P(o)-N structure was developed. The Mn-doped P(o) regions have a range of widths, but only those less than 10 microns wide have lased. Switching into the lasing state was achieved at 77K in the P-P(o)-N diodes, and they also switched from a low-current to a high-current state at room temperature. A theory of the switching speed of P-I-N diodes whose negative resistance arises from light absorbed in the high-resistance region was given for the limiting cases of high and low external circuit impedance.

AD-603 658 Div. 25
OTS Prices: HC $3.00/MF $0.75

Varian Associates, Palo Alto, Calif.
COHERENT INFRARED LASER.
Semi-annual technical summary rept. no. 2, 17 Dec 63-16 Jun 64,
by M. W. Muller and A. Sher. 16 Jun 64, 63p
Varian-314-2S
Contract Nonr4244 00
Unclassified report

Descriptors: (*Lasers, infrared radiation), (*Molecular spectroscopy, hydrogen), (*Hydrogen, molecular spectroscopy), Atomic energy levels, Distribution, Molecular electronics, Infrared spectroscopy, Vibration, Excitation, Signal-to-noise ratio, Cathodes, Quartz, Cooling, Deuterated compounds.

The report is concerned with techniques of obtaining population inversions among vibrational energy levels of molecules, with a view to using such inversions for the generation of coherent infrared light. The basis for obtaining population inversions is the Franck-Condon principle, and the first molecule under consideration, to which most of the work so far has been devoted, is half-heavy hydrogen HD. The work was primarily devoted to hydrogen spectroscopy. The development of a discharge tube is described. Results of spectroscopic work in the infrared are given. Spectra with high signal-to-noise ratio and resolution were recorded in the visible in order to determine population distributions among vibrational levels of hydrogen triplet states. The distributions inferred from these measurements are far from thermal and some population inversions are observed; these inversions however appear smaller than the values predicted by the Franck-Condon principle. The expected intensity distribution of the HD+ infrared spectrum for a range of temperatures was evaluated on a computer; these results are presented. (Author)

AD-603 680 Div. 25, 8
OTS Prices: HC $4.00/MF $0.75

Air Force Ints. of Tech., Wright-Patterson AFB, Ohio.
RESONANT ENERGY TRANSFER FROM MERCURY TO ZINC IN RELATION TO A GAS LASER.
Master's thesis,
by Robert Mason Howard, Jr. Aug 64, 108p
AFIT GSP/Phys/64 5
Unclassified report

We regret that legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Glow discharges, Spectroscopy), (*Lasers, Gases), (*Mercury, Lasers), (*Zinc, Lasers), Atomic energy levels, Resonance, Transport properties, Quantum mechanics, Discharge tubes, Excitation, Oscillation, Voltage, Argon, Phototubes, Pressure, Gain, Experimental data, Test methods, Atomic spectroscopy, Absorption spectrum.

An electronic system was constructed for scanning the spectral output of a Jarrell Ash spectrograph. This was used to observe the spectrum of a Hg-Zn discharge which originated from a heated D.C. glow discharge tube in which the partial pressures of Zn and Hg could be varied independently. Observations of the spectra indicate a resonant energy transfer from the 7(3)S Sub 1 state of Hg to the 4(3)D Sub 1 state of Zn at high voltages across the tube (anode to cathode). At lower voltages the 7(3)S Sub 1 Hg state couples to the 4(1)D Sub 2 state of Zn and indicates that a population inversion might be achieved in the Zn between the 4(1)DSub2 and 4(1)PSub1 state. (Author)

AD-603 681 Div. 25
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
EFFECTS OF PARTIAL CONDENSATION AROUND IONS IN ELECTRO-FLUID DYNAMIC ENERGY CONVERSION PROCESSES.
Master's thesis,
by John Alvern Decaire. Aug 64, 97p
AFIT GSP/Phys/64 2
Unclassified report

Descriptors: (*Magnetohydrodynamics, Energy conversion), (*Energy conversion, Magnetohydrodynamics), (*Colloids, Magnetohydrodynamics), Electric fields, Plasma medium, Drops, Condensation, Electrical corona, Nozzles, Water vapor, Carbon tetrachloride, Power supplies, Generators.

Harrison. For Zn it is shown that the series for the conductivity tensor converges slowly if it converges at all. It is concluded that the small pseudopotential approximation is not convenient for, and possibly not valid for, dealing with electrical transport in liquid metals. (Author)

AD-603 738 Div. 25
OTS Prices: HC $4.00/MF $0.75

Quantum Electronics Lab., Calif. Inst. of Tech., Pasadena.
STUDIES ON OPTICAL SCATTERING AS A TECHNIQUE FOR PLASMA DIAGNOSTICS.
Scientific rept. no. 1,
by S. E. Schwarz. May 64, 125p
Contract AF49 638 1322
AFOSR 64 1143

Unclassified report

Descriptors: (*Plasma medium, Analysis), Light, Scattering, Lasers, Laboratory equipment, Design, Signal-to-noise ratio, Doppler effect, Electrons, Temperature, Density, Electromagnetic pulses, Optical phenomena.

When a pulse of intense light from a giant-pulse laser passes through a plasma, a very small fraction of the light is scattered out of the beam as a result of ('Thomson') scattering by free electrons. Under suitable conditions the intensity of the scattered light is proportional to the density of free electrons, while its spectral distribution is related to the velocity distribution of the free electrons through the Doppler formula. Theoretical considerations are discussed. An apparatus for conducting scattering experiments was constructed. Measurements conducted at various times in the development of an afterglow plasma indicate Doppler broadening of the scattered light; the broadening disappears as the electrons cool during the first three microseconds of the afterglow. Measurements of electron density as a function of time were made in the afterglow. Two unexpected laser-plasma interactions were observed. The first is designated as 'induced plasma luminosity' and the second as 'giant scattering.' Both effects appear to be related to the presence of hydrocarbon impurities in the gas. (Author)

AD-603 743 Div. 25, 15
OTS Prices: HC $1.00/MF $0.50

Institute of Tech., Univ. of Minnesota, Minneapolis.
STEADY-STATE MOTIONS OF LARGE ELASTIC BODIES. PART A: DAMPING IN STEADY-STATE MOTIONS. PART B: A STEADY-STATE ANALOGUE TO ST. VENANT'S PRINCIPLE,
by W. H. Warner and R. Plunkett. 5 Aug 64, 16p
Contract NObs86783

Unclassified report

Descriptors: (*Elasticity, Theory), (*Damping, Mathematical analysis), Motion, Vibration, Mechanical waves, Viscoelasticity, Viscosity, Partial differential equations, Functions, Integral transforms, Equations, Load distribution, Pressure, Surface properties.

This report contains two parts. The first summarizes some results from the mathematical treatment of damping in steady-state motion. It is shown that the assumption of the complex modulus for so-called hysteretic or material damping does not lead to any results not implicit in the usual mathematical approach to linear elastic vibrations; further, viscous or viscoelastic behavior for steady-state motion leads to the same treatment. An experimental program to help to determine the proper physical hypothesis is suggested. The second part presents a tentative approach to the problem of establishing a sort of dynamic analogue, at least for steady-state motions, to the static St. Venant's principle of elasticity theory. The difficulties inherent in determining the pressure distribution between an indenter and a body lead one to want some way of finding the distance at which details of the distribution are no longer important. It is shown that total force and moment characteristics can be modeled and that these give the primary or lowest-order effects far from the loaded region. An estimation of the remainder effect, other than its order, is not as yet available. (Author)

AD-603 745 Div. 25, 8
OTS Prices: HC $6.00/MF $1.25

Acoustics Research Lab., Harvard Univ., Cambridge, Mass.
THE DIFFRACTION OF LIGHT BY SOUND.
Technical memo. no. 58,
by Stephen P. Gill. Jun 64, 262p
Contract Nonr1866 24, Proj. NR384 903

Unclassified report

Descriptors: (*Light, Diffraction), (*Diffraction, Light), (*Sound, Electromagnetic wave reflections), Electromagnetic waves, Acoustics, Equations, Quantum mechanics, Mathematical analysis.

The mathematical theory of the diffraction of electromagnetic waves by acoustic waves is fully developed from basic physical principles; earlier work of other authors on the subject is incorporated into the framework, and the analytical development of the theory has been greatly extended. The viewpoints of both quantum mechanics and classical mechanics have been synthesized to suggest analytical insights into the problem. (Author)

AD-603 761 Div. 25
OTS Prices: HC $2.00/MF $0.50

Rensselaer Polytechnic Inst., Troy, N. Y.
PHYSICAL MODEL OF A 3-CONSTANT ISOTROPIC ELASTIC MATERIAL,
by W. H. Hoppmann, II and F. O. F. Shahwan.
Jun 64, 34p
Contract DA30 069AMC195R

Unclassified report

Descriptors: (*Elasticity, Models (Simulations)), Materials, Theory, Loading (Mechanics), Deformation, Laboratory equipment.

A study is presented of the statical deformation of a model of a supposed 3-constant isotropic elastic material which exhibits the phenomenon of couple stresses. A description of the design and construction of the physical model is given. The related theory is briefly summarized and used in order to determine the three independent elastic constants which characterize the model of the material. The specific constitutive equations are presented. Experimental results are given for the model loaded in a mode which may be called pure bending. (Author)

AD-603 783 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

General Electric Co., Schenectady, N. Y.
SEMICONDUCTOR DEVICE CONCEPTS.
Scientific rept. no. 7,
by H. H. Woodbury, M. Aven, F. K. Heumann, and

computer. The results are used to calculate the effect of the stringer on the strength of the stress concentration at the crack tip and also at the edge of the circular cutout. (Author)

AD-603 713 Div. 25, 30
OTS Prices: HC $4.00/MF $0.75

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
INTENSITY MEASUREMENT IN NEAR FIELDS AND REVERBERANT SPACES,
by P. W. Smith, Jr., T. J. Schultz, and C. I. Malme.
24 Jul 64, 128p, BBN-1135
Contract Nonr3468 00, Proj. NR185 101
Unclassified report

Descriptors: (*Transducers, Calibration), (*Acoustics, Transducers), Sound, Intensity, Measurement, Anechoic chambers, Tanks (Containers), Experimental data, Graphics.

The usefulness of direct measurements of vector intensity for the calibration of acoustic transducers has been studied by laboratory experiments in anechoic and reverberant chambers and by analysis. Determination of total power output is feasible by intensity measurements in the near field and in reverberant spaces, situations where pressure measurements would be inadequate without elaborate calculation. However, the directional distribution of intensity differs from the desired far-field, free-space directivity both near a source and far from a source but in a reverberant space. Analysis shows no theoretical way to correct for these differences. In some limited circumstances, even though intensity measurements do not yield the exact directivity pattern, the differences may be acceptable. (Author)

AD-603 715 Div. 25, 8, 24, 26
OTS Prices: HC $3.00/MF $0.75

Research Triangle Inst., Durham, N. C.
INTEGRATED SILICON DEVICE TECHNOLOGY.
VOLUME III. PHOTOENGRAVING.
Rept. for Aug-Nov 63,
by J. J. Wortman. Jan 64, 80p
Contract AF33 657 10340, Proj. 4159, Task 415905
ASD TDR63 316 V3
Unclassified report

Descriptors: (*Semiconductor devices, Silicon), (*Photoengraving, Integrated circuits), (*Integrated circuits, Photoengraving), Manufacturing methods, Silicon coatings, Photosensitivity, Printing, Cleaning, Photographic techniques.

Within the limits of available information, this report describes typical photoengraving techniques used in silicon integrated device technology. The various types of photoresists and photosensitive coatings are described along with their known properties. Step-by-step procedures are included for the use of these resists. A general evaluation of the photoengraving process and its limits is included. (Author)

AD-603 716 Div. 25, 8, 26
OTS Prices: HC $7.00/MF $1.50

Research Triangle Inst., Durham, N. C.
INTEGRATED SILICON DEVICE TECHNOLOGY.
VOLUME IV. DIFFUSION.
Rept. for Feb 63-Jan 64,
by A. M. Smith. Feb 64, 306p
Contract AF33 657 10340, Proj. 4159, Task 415905
ASD TDR63 316 Unclassified report

Descriptors: (*Semiconductor devices, Silicon), (*Silicon, Impurities), Boron, Phosphorus, Solubility, Diffusion, Theory, Single crystals, Vapor plating, Surfaces, Preparation, Industrial equipment.

Both the theoretical and the practical aspects of impurity diffusion in silicon are discussed. Fick's second law is solved for a number of boundary conditions; the solutions obtained are compared with the measured data and shown to be valid only under certain experimental conditions. The experimentally determined values of the diffusion coefficients of 28 impurities in silicon are listed. Concentration, both of background impurity and diffusion impurity, can influence the value of the diffusion coefficient. This influence is illustrated by data from boron and phosphorus diffusions. Some typical, practical diffusion systems are described, emphasizing the techniques of open-tube diffusion of boron and phosphorus. (Author)

AD-603 719 Div. 25
OTS Prices: HC $1.00/MF $0.50

Israel Inst. of Tech., Haifa.
MEASUREMENT OF A QUANTUM ENSEMBLE BY A CLASSICAL APPARATUS.
Scientific rept. no. 5,
by Asher Peres and Nathan Rosen. 2 Feb 64, 20p
Grant AF EOAR63 107
ARL 64 184
Unclassified report

Descriptors: (*Quantum mechanics, Mathematical models), Particle beams, Measurement, Theory, Operators (Mathematics), Field theory, Test equipment, Israel.

A simple model of an ensemble of quantum systems interacting with a classical test body is described, the test body serving to measure the expectation value of dynamical variable of the quantum systems. An expression is derived for the minimum interaction needed to perform the measurement, and it is shown that an interaction which is strong enough to determine an expectation value will transform a pure-state ensemble into a mixture. The model can be generalized to the case in which the expectation values of several variables are measured. Finally, the test body is described by means of quantum mechanics and its most probable behavior is found to be that corresponding to the previous classical description. (Author)

AD-603 731 Div. 25, 17
OTS Prices: HC $3.00/MF $0.50

Institute for the Study of Metals, Univ. of Chicago, Ill.
RESISTIVITY AND HALL EFFECT IN LIQUID METALS,
by Bernard Springer. 1964, 51p
Contract Nonr2121 22
Unclassified report

Descriptors: (*Liquid metals, Electrical properties), Zinc, Lithium, Sodium, Resistance (Electrical), Hall effect, Electrical conductance, Tensor analysis, Power series.

A liquid metal is assumed in which the unscreened electron-ion interaction is the sum of spherically symmetric potentials. Using an exact expression for the conductivity tensor in a magnetic field, expressions are obtained for the Hall constant and for the zero-magnetic-field frequency-dependent conductivity tensor in the form of power series expansions in the potential. Effects due to the electron spin are ignored. Calculations are done for Zn, Li and Na using the pseudopotentials calculated by

Contract AF30 602 2782, Proj. 4506, Task 450603
RADC TDR64 204

Unclassified report

Descriptors: (*Pulse compression, Gas discharges), (*Plasma physics, Gas ionization), Electric discharges, Dielectric properties, X band, Radiofrequency pulses, Air, Nitrogen, Helium, Freon, Sulfur compounds, Fluorides, Voltage, Pulse generators.

Microwave breakdown of gases was studied under short-pulse conditions. An experimental technique was developed for generating and measuring high-power 10 nanosecond pulses at X-band frequencies. Breakdown times were in the range of 2 to 10 nanoseconds and values of E/p extended to 10,000 volts/cm-torr. Normalized breakdown curves for air, nitrogen, helium, Freon 12, SF sub 6, Freon C318 and Freon 114 were obtained and compared to theoretical estimates. The agreement was good. Comparison of these results with published breakdown data obtained with nanosecond video pulses enabled values of electron collision frequency to be calculated for air, helium and nitrogen at large values of E/p. For electron attaching gases it was found that some mechanism provided initial ionization and also effected the breakdown threshold. (Author)

AD-603 851 Div. 25, 30
OTS Prices: HC $3.00/MF $1.25

Oklahoma Univ. Research Inst., Norman.
AN EXPERIMENTAL STUDY OF INFRA-RED SCATTERING BY CLOUDS OF PARTICLES.
Interim technical rept. for Jan 63-Jan 64,
by T. J. Love and R. A. Wheasler. Jun 64, 219p
Contract AF33 657 8859, Proj. 7063, Task 706303
ARL 64 109

Unclassified report

Descriptors: (*Infrared radiation, Scattering), (*Aerosols, Infrared radiation), Aerosol generators, Aluminum, Powder metals, Particles, Spheres, Optical equipment, Optics, Data, Graphics.

This report describes a study of the extinction and scattering of infra-red radiation from an aerosol of fine particles. A description is given of the method developed for generation of a uniform optically thin cloud of particles. Reynolds aluminum 40XD powder was used for this test. The optical equipment including glo-bar source, focusing optics, traversing mechanism and Perkin Elmer model 98 monochromator is described. The extinction coefficient and normalized scattering function is reported for 21 wave lengths of incident radiation. (Author)

AD-603 853 Div. 25
OTS Prices: HC $2.00/MF $0.50

Polytechnic Inst. of Brooklyn, N. Y.
FURTHER COMPARISONS OF ELASTICITY AND SHELL THEORY SOLUTIONS,
by Jerome M. Klosner and Howard S. Levine.
Jul 64, 40p PIBAL-689
Contract Nonr839 17, Proj. NRO64 427

Unclassified report

Descriptors: (*Structural shells, Theory), (*Elasticity, Structural shells), (*Stiffened cylinders, Elasticity), Elastic shells, Cylindrical bodies, Loading (Mechanics), Deformation, Stresses, Equations.

The problem of an infinite circular cylindrical shell subjected to periodically spaced axisymmetric band loads is investigated using a Reissner-Naghdi higher-order shell theory. The generalized equilibrium equations, which include the effects of transverse normal stress and transverse shear deformation, were applied to the specific problem at hand. These equilibrium equations were successfully uncoupled, and an expression describing the transverse displacement of the median surface was obtained. The solution of this expression was then used to calculate the stress resultants, stresses, and displacements. A comparison of the resulting stresses and displacements with the exact elasticity solution and some lower-order shell theory solutions of the same problem was carried out for ratios of inner to outer shell radius equal to 0.7, 0.8, 0.87, 0.9, 0.93, and for a ratio of distance between band loads to outer shell diameter equal to 0.2. The ratio of band width to distance between band loads was also equal to 0.2. The Poisson's ratio used is equal to 0.3. (Author)

AD-603 854 Div. 25, 22
OTS Prices: HC $3.00/MF $0.75

Ballistic Research Labs., Aberdeen Proving Ground, Md.
TORSIONAL VIBRATIONS OF A HOLLOW VISCOELASTIC CYLINDER,
by William Goldberg. Jun 64, 60p
Proj. 1A222901A211
BRL MR1570

Unclassified report

Descriptors: (*Cylindrical bodies, Vibration), (*Viscoelasticity, Mathematical Analysis), Propellants, Polyethylene plastics, Rods, Mechanical properties, Elasticity, Shear stress, Models (Simulations), Differential equations, Operators (Mathematics).

The motion of a hollow viscoelastic cylinder with outer cylindrical surface fixed, and inner surface bonded to a mass and subjected to a step function of torque is analyzed. The method used is an extension of the engineering vibration analysis of normal modes and normal coordinates. In analogy to elastic analysis, the characteristic numbers associated with these modes depend only upon the boundary conditions and not on the mechanical properties of the cylinder. The characteristic frequencies, however, do depend on the material properties. Numerical calculations were performed on the BRLESC digital computer using two different high-order differential operator representations of the shear modulus of polyisobutylene. The calculations demonstrate (1) the effect of different model representations of the shear modulus; and (2) the effect of the attached mass on the transient response of the cylinder. (Author)

AD-603 855 Div. 25, 15
OTS Prices: HC $0.50/MF $0.50

Army Materials Research Agency, Watertown, Mass.
SINGLE EDGE CRACKS IN RECTANGULAR TENSILE SHEET,
by Oscar L. Bowie and Donald M. Neal. May 64, 17p
Proj. 1A010501B010
AMRA TR64 13

Unclassified report

Descriptors: (*Sheets, Tensile properties), (*Fracture (Mechanics), Sheets), Elasticity, Stresses, Complex variables, Integrals, Numerical analysis, Functions, Series, Mapping (Transformations), Rectangular bodies.

The stress intensity factors for single edge cracks in rectangular tensile sheet are studied by using a complex variable form of analysis. The results for deep cracks

R. N. Hall. 5 May 64, 67p
Contract AF19 628 329, Proj. 4608, Task 460805
AFCRL 64 467

Unclassified report

Descriptors: (*Semiconductor devices, Preparation), Cadmium compounds, Tellurides, Sulfides, Zinc compounds, Selenides, Electrical properties, Heat treatment, Electron bombardment, Impurities, Copper, Chlorine, Aluminum, Tracer studies, Crystal lattice defects, Optical properties, Single crystals, Gallium alloys, Arsenic alloys, Crystal growth, Luminescence, Absorption spectrum.

Studies of the defect chemistry of the II-VI compounds were continued (see AD-433 975) and a comparison was made of the electrical behavior of CdTe, CdS, and ZnSe following either thermal firings or 1.5 Mev electron bombardment. The diffusion of Cu into undoped ZnS as well as Cl-doped and Al-doped ZnSe was investigated by radiotracer techniques. The results were used to correlate the electrical and optical activity of some defect centers in II-VI compounds. The halogen transport growth of GaAs(x)P(1-x) crystals continued. Laser quality material is being produced, but the ingots, while relatively homogeneous, are polycrystalline. Several ingots of GaAs and GaAs(x)P(1-x) were made using a lower furnace temperature. These ingots have large single-crystal regions and are more homogeneously doped than previous ones. Exciton and related luminescence phenomena that occur near the band edge of a semiconductor are discussed and compared with the absorption spectrum. (Author)

AD-603 811 Div. 25
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
EFFECT OF CREEP ON COLUMN DEFLECTION,
by T. P. Higgins, Jr. Rev. 26 Jun 51, 54p P-51

Unclassified report

Descriptors: (*Structural parts, Creep), (*Creep, Structural parts), Beams (Structural), Aluminum, Deflection, Buckling (Mechanics), Loading (Mechanics), Compressive properties, Stresses, Iterative methods, Airframes.

The effect of creep on structural elements which carry compressive loads must be known in order that minimum weight structures may be designed for service conditions which are a combination of high temperature and high working stress. A simple pin-ended column is analyzed under similar conditions as a logical basis for future understanding of integrated structures. The creep buckling problem is formulated mathematically. However, due to the complexity of the problem, an interation method is presented which enables one to calculate the lateral deflection as a function of time. Theoretical calculations of the iteration method are compared with tests on 75 ST aluminum columns at 600F. Design curves are proposed which will give the allowable stress of the column as a function of the slenderness ratio and the life-time of the column. Different design curves are required for each combination of material and operating temperatures. (Author)

AD-603 815 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
MEASUREMENTS OF TRUE DARK CONDUCTIVITIES IN FERROCENE CRYSTALS,
by Edward Zehler and Claire Loscoe. May 64, 22p
Task 1G6 22001A056 04 22
AELRDL TR2459

Unclassified report

Descriptors: (*Semiconductors, Ferrocenes), (*Ferrocenes, Electrical conductance), Metalorganic compounds, Single crystals, Crystal growth, Electric connectors, Dielectric properties, Anisotropy, Thermoelectricity, Models (Simulations).

The report describes systematic dark conductivity measurements on a monomeric organic crystal. The material chosen is ferrocene, a metallo-organic compound, and single crystals were grown from solutions or the melt by the Bridgman technique. From the measurements performed, including four-probe measurements, voltage probing between contacts, guard ring methods, and long time observations, it can definitely be established that contact effects and dielectric relaxation have a minor effect on the resistance of the sample, provided sufficient time is allowed for the observation, and that a true dark conductivity and activation energy can be determined within a few percent accuracy. Furthermore, a slight anisotropy exists for the different crystal directions but the impurity content of the crystals does not significantly influence the conductivity, indicating an intrinsic type of conduction mechanism. These findings are supported by thermoelectric measurements on these materials which indicate that holes are, at room temperature, more mobile than electrons. The implications of these data for establishing a model for the dark conductivity are discussed and recommendations made for further investigations. (Author)

AD-603 817 Div. 25, 2
OTS Prices: HC $2.00/MF $0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
THEORETICAL STUDY OF THE PROPAGATION OF INFRASONIC WAVES IN THE ATMOSPHERE. EXTENSION OF THE METHOD OF NORMAL MODES TO WAVE PROPAGATION IN AN ALMOST-STRATIFIED MEDIUM.
Scientific rept. no. 1,
by Allan D. Pierce. 31Jul 64, 40p RAD-TR-46-23
Contract AF19 628 3891, Proj. 7637, Task 763702
AFCRL 64 526

Unclassified report

Descriptors: (*Sound, Propagation), (*Wave transmission, Atmosphere), Frequency, Waveguides, Sound transmission, Theory.

A theory is presented which permits the extension of the method of normal modes to guided wave propagation in a medium with properties varying slowly with horizontal coordinates in addition to varying with the vertical coordinate. The principal assumption of the neglect of coupling between normal modes is justified as long as the horizontal wave numbers of different modes are not too closely spaced. It is predicted that different frequencies in different modes follow different horizontal paths. A ray tracing method is described for computing these paths. The theory is then applied to the study of the dispersion of waves from an explosive source in shallow water with slowly varying depth. (Author)

AD-603 818 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

Microwave Associates, Inc., Burlington, Mass.
NANOSECOND-PULSE BREAKDOWN STUDY AT MICROWAVE FREQUENCIES.
Final rept.,
by C. Buntschuh and M. Gilden. Jul 64, 67p

AD-603 924 Div. 25, 13
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TIME-DEPENDENT STRESS-STRAIN DISTRIBUTIONS,
by T. P. Higgins, Jr. 18 Jun 51, 20p P-218
Unclassified report

Descriptors: (*Stresses, Structural parts), (*Strain (Mechanics), Creep), (*Beams (Structural), Mechanical properties), Time, Elasticity, Loading (Mechanics), Deflection, Deformation, Buckling (Mechanics), Equations.

Using data which can be obtained from conventional constant stress tests, a method is developed to determine the amount of inelastic strain that occurs for non-linear stress-time variations. The method is applicable to transient and steady state creep and enables one to determine the stress-strain distributions when they are a function of time. (Author)

AD-603 934 Div. 25
OTS Prices: HC $2.00 MF $0.50

Harry Diamond Labs., Washington D. C.
THE CONTRIBUTION OF THE TWO-MAGNON PROCESS TO MAGNETOSTATIC MODE RELAXATION,
by Joseph Nemarich. 10 Aug 64, 33p
Projs. 1A010501A015, 36700
HDL TR 1245
Unclassified report

Based on a dissertation submitted to the Univ. of Maryland in partial fulfillment of the requirements for Ph. D. in Physics.

Descriptors: (*Magnetic resonance, Magnetic materials), (*Magnetic materials, Single crystals), Yttrium, Iron, Garnet, Spheres, Line spectrum, X band, Magnetic fields, Measurement, Surface properties, Scattering, Mathematical analysis, Impurities, Rare earths, Relaxation time, Dielectrics.

The linewidths of the magnetostatic modes have been measured at x-band with the static magnetic field along the (111) direction in several highly polished spheres of single-crystal pure yttrium iron garnet (YIG). The large variations of the magetostatic mode linewidths previously found in larger linewidth spheres were not observed in highly polished YIG spheres. However, there is a residual variation of mode linewidths at both 300K and 4.2K, the variations being somewhat larger at 4.2K. It was found that the essential features of the variation of mode linewidths in a highly polished YIG sphere can be explained by the surface pit-scattering theory of Sparks, Loudon, and Kittel when the linewidth predicted by this theory is multiplied by an enhancement factor F sub nmr to include the effect of the spatial variation of magnetization intensity for the individual magnetostatic modes. The observed spectrum of magnetostatic modes in a YIG sphere at 4.2K are presented and compared with the theoretical spectrum for modes up to order n = 6. The agreement between the calculated and observed spectrum is good if propagation effects are taken into account.

AD-603 935 Div. 25, 7, 17
OTS Prices: HC $2.00/MF $0.50

Atomics International, Canoga Park, Calif.
RESEARCH ON PROPERTIES OF HIGH CURRENT, LOW FREQUENCY ELECTRODELESS DISCHARGES.
Annual technical summary rept.,
by C. A. Guderjahn. 1964, 45p AI-64-48
Contract AF49 638 1222, Task 9752 01
AFOSR 64 0999
Unclassified report

Descriptors: (*Gas discharges, Vapors), (*Alkali metals, Gas discharges), (*Mercury, Gas discharges), (*Magnetohydrodynamics, Gas discharges), Plasma physics, Very low frequency, Cesium, Rubidium, Potassium, Alternating current, Electrical conductance, Resistance (Electrical), Low frequency, Power supplies, Discharge tubes, Density, Pressure, Ionization, Magnetic field, Electric field, Generators.

Alternating current, low pressure electrodeless discharges were excited in cesium, rubidium, potassium, and mercury vapors by magnetic induction. In each case the discharge tube was a toroid forming the secondary of an iron core transformer whose frequency range was 1 to 40 kc. The resistivities of the discharges were measured as a function of current density (1 to 30 amp/sq cm) and pressure (1 to 300 microns). The discharges were diffusion controlled and strongly ionized with electron-charged particle interactions being the principal contribution to resistivity. Resistivities were of the order of 0.2 omega cm. (Author)

AD-603 936 Div. 25
OTS Prices: HC $1.00/MF $0.50

Institute of Engineering Research, Univ. of California, Berkeley.
ON THE DERIVATION OF DISCONTINUITY CONDITIONS IN CONTINUUM MECHANICS,
by A. E. Green and P. M. Naghdi. Jul 64, 11p
AM-64-11
Contract Nonr222 69, Proj. NR064 436
Unclassified report

Descriptors: (*Continuum mechanics, Mass energy relation), (*Boundary value problems, Continuum mechanics), Equations, Motion, Invariance, Momentum, Energy, Inequalities, Differential geometry.

The usual discontinuity conditions at a surface of discontinuity in classical continuum mechanics are derived from an equation of energy and the use of invariance conditions under superposed rigid body motions. The modifications required when director and dipolar displacement fields are present are also indicated. (Author)

AD-603 937 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Weizmann Inst., Rehovoth (Israel).
RESEARCH ON MEASUREMENT OF PRESSURE INDUCED SHIFTS OF ABSORPTION LINES IN THE INFRARED SPECTRUM.
Annual summary rept. no. 3, 1 Dec 62-31 Dec 63,
by J. H. Jaffe. May 64, 7p
Contract AF61 052 388
AFCRL 64 629
Unclassified report

Descriptors: (*Molecular spectroscopy, Pressure), (*Infrared spectroscopy, Line spectrum), Absorption spectrum, Emissivity, Oscillation, Hydrochloric acid, Deuterated compounds, Hydrogen compounds, Chlorides, Cyanides, Cryogenics, Solidified gases, Helium group gases, Israel.

A comparison of pressure induced shifts in infrared emission and in absorption spectra revealed no differences between the two in a given system. It was found

show a considerable increase in the intensity factors as compared to the case of symmetric edge cracks. Accurate numerical values of the stress intensity factors for the appropriate range of parameters are included. (Author)

AD-603 862 Div. 25
OTS Prices: HC $3.00/MF $0.75

Polytechnic Inst. of Brooklyn, N. Y.
TRANSIENT RESPONSE OF A PERIODICALLY SUPPORTED CYLINDRICAL SHELL IMMERSED IN A FLUID MEDIUM,
by Harry Herman and Jerome M. Klosner.
Jul 64, 68p PIBAL-690
Contract Nonr839 17, Proj. NR064 427
Unclassified report

Descriptors: (*Stiffened cylinders, Pressure), (*Structural shells, Cylindrical bodies), Fluids, Sound, Steel, Deflection, Structural properties, Harmonic analysis, Fourier analysis, Integral transforms, Integral equations.

The dynamic response of a periodically simply supported, infinitely long, circular cylindrical shell to a pressure suddenly applied through the surrounding acoustic medium is investigated. The incident particle velocity is zero, and the pressure is assumed to have an harmonic spatial variation parallel to the shell axis. The exact solution is obtained by use of a Fourier integral transform, and the resulting inversion integral is evaluated by numerical and asymptotic integration. Two solutions to the same problem are obtained by using a plane and cylindrical wave approximation for the radiated field. The range of their applicability is investigated. For a steel shell in water, it is found that when the supports are placed three shell diameters apart, the use of the cylindrical wave approximation results in a 5% underestimation of the maximum deflection, while when the supports are placed one-sixth of a shell diameter apart the approximations are invalid. (Author)

AD-603 872 Div. 25
OTS Prices: HC $1.00/MF $0.50

New Mexico State Univ., University Park.
THE EFFECTIVE FIELD IN CRYSTALS WITH OVERLAPPING ATOMS,
by O. Theimer and R. Paul. 1964, 22p
Unclassified report

Supported in part by the Office of Naval Research.

Descriptors: (*Crystal lattices, Polarization), Atomic orbitals, Electric fields, Refractive index, Symmetry (Crystallography), Moments, Hydrogen, Integral transforms, Differential equations.

AD-603 897 Div. 25
OTS Prices: HC $5.00/MF $1.00

Naval Research Lab., Washington, D. C.
MEASUREMENTS ON FREE-FLOODED MAGNETOSTRICTIVE RINGS.
Interim rept.,
by J. Chervenak. 17 Mar 64, 167p
NRL MR1513
Unclassified report

Descriptors: (*Underwater sound, Transducers), (*Transducers, Magnetostrictive elements), (*Magnetostrictive elements. Transducers), Underwater sound signals, Rings, Vibration, Acoustic impedance, Measurement, Calibration.

Magnetostrictive ring transducers are rugged and relatively insensitive to hydrostatic pressure when used in a free-flooded condition. Therefore, arrays of this type of transducer are ideally suited for deep submergence applications provided acoustic beam directionality is not required. The report is concerned with measurements which show how spacing between free-flooded coaxially mounted rings in a line array affects acoustic beam patterns, bandwidth, and efficiency. Information on individual rings is provided as an aid to a better understanding of some measurements made on the array. (Author)

AD-603 900 Div. 25
OTS Prices: HC $0.75/MF $0.50

Harry Diamond Labs., Washington, D. C.
MEASUREMENT OF NARROW MAGNETIC RESONANCE LINEWIDTHS,
by Joseph Nemarich. 10 Aug 64, 29p
Projs. 1A010501A015, 36700
HDL TR1246
Unclassified report

Descriptors: (*Microwave spectroscopy, Errors), (*Magnetic resonance, Spectrum analyzers), Cavity resonators, Line spectrum, Magnetic fields, Ferrites, Garnets, Iron compounds, Yttrium compounds, Measurement.

A discussion is given of the origin of various errors that may occur in the measurement by cavity perturbation techniques of narrow magnetic resonance linewidths. It is shown that the absorption by a spherical magnetic sample in a microwave cavity varies as sin (2) theta, where theta is the angle between the static and microwave magnetic fields. A method of choosing the optimum cavity parameters for minimizing measurement errors is presented, and a proof is given of a tuning technique that has been used to compensate for dispersion of the cavity resonance during a measurement. A detailed description is presented of a magnetic resonance spectrometer that has been used for the accurate measurement of magnetic resonance absorptions with widely varying intensities and very narrow linewidths. (Author)

AD-603 901 Div. 25
OTS Prices: HC $1.00/MF $0.50

Harry Diamond Labs., Washington, D. C.
PLASMA WAVES,
by E. L. Resler, Jr. and Fred T. Harris.
30 Jun 64, 35p
Proj. 39930
HDL TR1237
Unclassified report

Descriptors: (*Plasma physics, Mechanical waves), Plasma oscillations, Magnetic fields, Acoustics, Damping, Electromagnetic waves, Magnetohydrodynamics, Scattering, Cerenkov radiation, Optical phenomena, Ions, Fluid mechanics, Reviews, Gas ionization.

The macroscopic theory for a fully ionized gas is presented. A common treatment is given covering certain phenomena of current interest. The equations describing a plasma are derived and are shown to include many of the phenomena long familiar to scientists. Among the phenomena treated are: sound waves, plasma oscillations, acoustical damping, magneto-ionic theory, Friedrichs' waves, and cold, collisionless plasma. (Author)

AD-603 968 Div. 25
OTS Prices: HC $1.00/MF $0.50

Florence Univ. (Italy).
MANY ELEMENT LASERS.
Scientific rept. no. 1,
by R. Pratesi, L. Ronchi, and G. Toraldo di Francia.
Apr 64, 23p
Contract AF61 052 720
AFCRL 64 604

Unclassified report

Descriptors: (*Lasers, Scientific research), Reflection, Rods, Optical properties, Diffraction, Air, Oscillation, Spectroscopy, Interferometers, Ruby, Mathematical analysis, Italy.

Theoretical and experimental results are reported, obtained with a solid-state laser consisting of many active elements in series. A statistical treatment is developed to derive the oscillation conditions. Asymptotic expressions are given of the threshold gain per unit length holding either for a very large number of elements or for inner surface reflectivities close to 1. It turns out that lossless reflections at the inner surfaces can increase the cavity Q with respect to a one-element laser of the same active length. Preliminary experiments with five and ten-elements lasers demonstrate the mode selection property of the many element laser and show the tendency of the system to a 'quasi-continuous' emission. The possibility of obtaining some optical correction of the defects inherent in the solid material was also demonstrated. (Author)

AD-603 976 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center,
Redstone Arsenal, Ala.
PHYSICAL BASIS OF SEPARATING HELIUM AND NITROGEN,
by R. M. Ruemann and A. Fedoritenko. 27 Jul 64, 17p
RSIC 226; TT 64 71206

Unclassified report

Trans. of Zhurnal Tekhnicheskoi Fiziki (USSR) 1937, v. 7, no. 4, p. 335-342.

Descriptors: (*Helium, Purification), (*Nitrogen, Separation), Cryogenics, Phase studies, Thermodynamics, USSR.

Determinations are given for diagrams of p - x - mixtures of helium-nitrogen under pressure of 5 to 150 atm and at temperatures of 64, 78, 90 and 108K and diagrams of T-x at 4 and 20 atm. Calculations are given for i-x-diagrams for pressures of 4 and 20 atm on the basis of T-x-diagrams. The purpose of the study was to solve the problem of obtaining pure helium from natural gases with the least possible losses of helium. (Author)

AD-604 007 Div. 25, 4, 9, 14, 15, 17
OTS Prices: HC $0.75/MF $0.50

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
A BRIEF SYNOPSIS OF IN-HOUSE RESEARCH.
Sep 64, 26p
ARL 64 159

Unclassified report

Descriptors: (*Reports, Air force research), (*Air force research, Reports), Solid state physics, Plasma physics, Chemistry, Physics, Metallurgy, Mathematics, Ceramic materials, Fluid dynamic properties, Thermodynamics, High-temperature research, Semiconductors, Radiation, Spectroscopy, Astrophysics, Nuclear physics, Metals, Radiation chemistry, Liquefied gases, Phase studies, Fracture (Mechanics), Fatigue (Mechanics), Hypersonic flow.

Contents:
Solid state physics research, plasma physics research, general physics research, chemistry research, metallurgy and ceramics research, applied mathematics research, hypersonic research, fluid dynamics facilities, thermo-mechanics research.

AD-604 014 Div. 25, 13
OTS Prices: HC $2.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
BUCKLING OF AXIALLY COMPRESSED SANDWICH CYLINDERS.
Technical rept.
by B. O. Almroth. Jul 64, 41p LMSC-6-62-64-9

Unclassified report

Descriptors: (*Buckling (Mechanics), Cylindrical bodies), (*Cylindrical bodies, Sandwich construction), (*Sandwich construction, Buckling (Mechanics), Stability, Loading (Mechanics), Shear stresses, Deformation, Integral equations, Differential equations, Compressive properties.

In a previous report a practical method of stability analysis was derived for axially compressed orthotropic cylinders. The method was based on upper and lower bounds to the critical load. However, in the analyses of these bounds the effects of transverse shear forces were neglected, and therefore the results were not applicable to cylinders of weak-core sandwich design. The analysis presented here modifies the previous analysis by inclusion of such effects. Numerical results for the two bounds are given in graphical form. (Author)

AD-604 015 Div. 25, 22
OTS Prices: HC $2.00/MF $0.50

Naval Ammunition Depot, Crane, Ind.
A METHOD FOR DETERMINING THE EFFECTIVE EMITTING TEMPERATURE OF A RADIATING BODY,
by George E. Laramore and Duane M. Johnson.
3 Aug 64, 30p
NAD-CI RDTR44

Unclassified report

Descriptors: (*Flares, Temperature), (*Thermal radiation, Measurement), Flames, Light, Spectrophotometers, Photomultipliers, Calibration, Aircraft flares, Parachute flares.

A method for determining the effective emitting temperature of an incandescent body is described. Theoretical derivations and restrictions upon the method are given. The effective emitting temperature of the flame of parachute flare is determined as an illustration of the method. (Author)

AD-604 020 Div. 25
OTS Prices: HC $1.00/MF $0.50

Columbia Univ., New York.
ON THE TEMPERATURE-TIME EQUIVALENCE OF THERMORHEOLOGICALLY SIMPLE VISCOELASTIC MATERIALS.

that when HC1 is perturbed with DC1 or HF (and when HCN is perturbed with HC1), every other line in a vibration-rotation band is shifted to a higher frequency and the intervening lines are shifted to lower frequency. These shift oscillations are probably due to near-resonant dipole interactions between the pairs. Efforts were begun to investigate weak molecular interactions by imbedding the absorbing molecule in a solid noble gas matrix at liquid He temperatures.

AD-603 939 Div. 25
OTS Prices: HC $2.00/MF $0.50

Institute of Engineering Research, Univ. of California, Berkeley.
SOME REMARKS ON THE LINEAR THEORY OF SHELLS,
by A. E. Green and P. M. Naghdi. Apr 64, 30p
AM-64-8
Contract Nonr222 69, Proj. NR064 436
Unclassified report

Descriptors: (*Elastic shells, Theory), Structural shells, Elasticity, Stresses, Deformation, Equations, Boundary layer, Numerical analysis.

The method of asymptotic expansion of the three-dimensional equations of linear elasticity is briefly re-examined, simplified and extended to dynamic problems. Moreover, via a new derivation of the bending equations of shells (called here shell equations), the results of two lines of attack are shown to be related. Other aspects of the subject dealt with include the reduction of shell equations to the simpler basic ingredients resulting from the asymptotic expressions, a procedure for the solution of static problems which may prove useful in some cases, and a discussion of boundary layer equations and edge effects.

AD-603 948 Div. 25, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ALL UNION CONFERENCE ON THE TECHNIQUE OF INFRARED RADIATION AND ITS UTILIZATION IN SCIENCE AND INDUSTRY (NO. 1) [BRNO, NOV 62].
by V. Kotesovec. 3 Aug 64, 11p
FTD TT64 211, TT 64 71210
Unclassified report

Unedited rough draft trans. of Jemna Mechanika a Optika (Czechoslovakia) 1963, v. 8, no. 2, inside covers.

Descriptors: (*Infrared radiation, Scientific research), (*Infrared equipment, Industrial production), Conferences, Infrared research, Czechoslovakia, Infrared detectors, Heating, Optical phenomena.

A general report of the conference includes: Physics of infrared radiation; Elements of infrared radiation; Applicance technique; Natural sciences and medicine; and Heating with infrared radiation.

AD-603 950 Div. 25
OTS Prices: HC $1.00/MF $0.50

AVCO-Everett Research Lab., Everett, Mass.
THOMSON SCATTERING COMPUTATIONS FOR LABORATORY PLASMAS,
by Edward T. Gerry and Richard M. Patrick.
Aug 64, 10p Avco RR-187
Contract AF49 638 1129
Unclassified report

Descriptors: (*Plasma medium, Scattering), (*Lasers, Scattering), Spectroscopy, Hydrogen, Ions, Electrons, Optical phenomena.

The note presents some calculations of the spectrum of Thompson scattering of a laser beam from typical laboratory plasmas. These calculations are numerical results based on theoretical work by Salpeter. The results show that the character of the spectrum depends upon the ratio of the length in the plasma over which the scattered spectrum adds coherently to the Debye length alpha. For small alpha, i.e. alpha < 0.1, the spectrum is simply an electron Doppler broadened spectrum. For medium alpha (0.1 < alpha < 1), the spectrum shows Doppler broadening due to both the ions and electrons, and for large alpha (1 < or = alpha) there are peaks in the scattered spectrum displaced from the primary laser frequency by an amount approximately equal to the plasma frequency. These three regions are graphically displayed along with a universal numerical scattering calculation for a hydrogen plasma with equal ion and electron temperatures. Further, some typical cases are calculated for hydrogen plasmas showing the character of all three regions of alpha and the effect of changing scattering angle. (Author)

AD-603 951 Div. 25
OTS Prices: HC $3.00/MF $0.75

AVCO-Everett Research Lab., Everett, Mass.
MHD CHARACTERISTICS AND SHOCK WAVES,
by A. R. Kantrowitz and H. E. Petschek. Jul 64, 75p
Avco RR-185
Contract AF49 638 659, Proj. 9752, Task 37521
Unclassified report

Descriptors: (*Magnetohydrodynamics, Theory), (*Shock waves, Theory), Entropy, Magnetic fields, Shock tubes, Energy conversion.

A review of the theory of MHD characteristics and shock waves is presented. Primary emphasis is placed on a physical discussion of the three characteristic modes and the jump conditions for the two types of shock waves which can exist. Brief discussions of shock structure, applications of the theory, and the range of applicability of the continuum equations are also given. (Author)

AD-603 967 Div. 25
OTS Prices: HC $2.00/MF $0.50

Florence Univ. (Italy).
LASER CAVITIES TERMINATED BY DIFFRACTION GRATINGS.
Technical note no. 1,
by L. Ronchi and A. M. Scheggi. Mar 64, 32p
Contract AF61 052 536
AFCRL 64 355
Unclassified report

Descriptors: (*Lasers, Cavity resonators), (*Diffraction gratings, Lasers), Mirrors, Light, Propagation, Amplifiers, Reflection, Numerical analysis, Integral equations, Functions, Frequency, Italy.

A theoretical study is performed of the resonant modes of a laser cavity having end mirrors with periodic reflectivity. A particular example is examined in which the end mirrors are constituted by two identical strip diffraction gratings. The modes and the corresponding eigenvalues are evaluated in successive approximations. It was found that a particular frequency exists for which losses are very low, while neighboring frequencies suffer heavy losses. This effect increases very rapidly with the total number of strips in the grating. (Author)

AD-604 046 Div. 25, 7, 8, 30
OTS Prices: HC $3.00/MF $0.75

Rensselaer Polytechnic Inst., Troy, N. Y.
PHYSICAL PHENOMENA FOR LOGICAL FUNCTIONS.
Final technical rept.,
by Walter R. Beam. 15 Feb 64, 76p
Grant AF AFOSR62 194
AFOSR 64 1379
Unclassified report

Descriptors: (*Computer logic, Semiconductor devices), (*Semiconductor devices, Computer logic), Digital computers, Neuristors, Thin films (Storage devices), Niobium alloys, Oxides, Computer storage devices, Topology, Power supplies, Reliability (Electronics), Feasibility studies.

There are a number of physical phenomena occurring in solids which have some promise for application to logical devices. Some of these have been partially explored and at least for the present, discarded. Others have received no consideration, not even a feasibility evaluation. The purpose of this work is to consider some of these phenomena to discover in what form and how well they might be used to construct devices and implement useful logical functions. Technical study areas include: Distributed constant neuristors, niobium oxide negative resistance elements, minimum complexity digital electronics, continuous-medium domain logic and memory devices, and some remarks on topology and power supply of logical networks.

AD-604 047 Div. 25, 15
OTS Prices: HC $2.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
THE SPECTRUM OF RANDOM VIBRATION OF A NONLINEAR OSCILLATOR,
by Stephen H. Crandall. Jun 64, 28p
Contract AF49 638 1314
AFOSR 64 1057
Unclassified report

For presentation of the Inernational Congress of Applied Mechanics (no. 11) Munich, 5 Sep 64.

Descriptors: (*Vibration, Nonlinear systems), Statistical processes, Statistical functions, Probability, Mechanics, Perturbation theory, Statistical analysis.

When a linear vibratory system is excited by a stationary random process the most useful statistical description of the response is given by either the autocorrelation function or the spectral density. The exact calculation of these statistics for a nonlinear oscillator remains an unsolved problem although a general approach has been outlined. This paper describes three approximate procedures which apply to systems which are only slightly nonlinear. The procedures are perturbation, equivalent linearization, and a new heuristic method based on simply averaging the deterministic properties of the nonlinear system. This latter procedure is an extension of the heuristic method recently introduced for obtaining the expected frequency of the stationary response of a nonlinear oscillator. It is shown that for vibratory systems with small stiffness nonlinearities all three procedures give autocorrelations (and spectra) which are identical to first order in the nonlinearity parameter. (Author)

AD-604 058 Div. 25, 2, 9, 12
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DECELERATION AND MASS CHANGE OF AN ABLATING BODY DURING HIGH-VELOCITY MOTION IN THE ATMOSPHERE,
by Carl Gazley, Jr. Jul 64, 46p P-2900-1
Unclassified report

Descriptors: (*Atmosphere entry, Ablation), (*Meteors, Ablation), (*Hypersonic flight, Ablation), Deceleration, Weight, Velocity, Drag, Superaerodynamics, Heat transfer.

The paper examines the factors affecting the dynamics and mass loss of ablating bodies during high-velocity motion. The classic meteor case, where the flow is assumed to be of the free-molecule type with constant heat-transfer and drag coefficients, is reviewed and presented in terms of general dimensionless parameters which allow application to cases other than that of meteor atmospheric entry. This solution indicates a finite mass remaining after the deceleration, the magnitude of the mass relative to the initial mass depending on the 'efficiency'. An analytic solution is obtained for the specific variation of the heat-transfer coefficient corresponding to a sphere with laminar convective heating in hypersonic flight at a constant altitude. In this case, the increase of dimensionless heat-transfer coefficient due to decreasing body size (thus effectively increasing the 'efficiency') can result in a complete loss of mass during the deceleration process. (Author)

AD-604 072 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THERMAL STRESSES IN A PARTIALLY CLAMPED ELASTIC HALF-PLANE,
by J. H. Huth. 10 Mar 52, 12p P-274
Unclassified report

Descriptors: (*Thermal stresses, Structural parts), (*Structural parts, Elasticity), Strain (Mechanics), Deflection, Mathematical analysis.

Numerical methods have made amenable to approximate analysis a large class of problems in the theory of elasticity. However, certain loadings must occasionally be considered which may give rise to theoretical stress singularities. One such problem is that of determining the thermal stresses in a partially clamped elastic half-plane. The solution given assumes self-equilibriating tractions over the clamped portion of boundary so that the results apply approximately also to large finite areas. (Author)

AD-604 088 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

General Electric Co., Schenectady, N. Y.
MILLIMETER WAVE GENERATION BY PLASMA.
Final engineering rept.
May 64, 83p
Contract NObsr89507, Proj. SR008 03 01, Task 9389
Unclassified report

Prepared in cooperation with General Electric Co., Syracuse, N. Y.

Descriptors: (*Millimeter waves, Plasma oscillations), (*Plasma oscillations, Millimeter waves), Electromagnetic waves, Electron guns, Electron beams, Velocity, Plasma medium, Magnetic pinch, Space charges, Mercury, Vapors, Waveguides, Electronic equipment, Feasibility studies.

The purpose of this experiment was to demonstrate the feasibility of generating a radiating electromagnetic wave by the interaction of a velocity modulated electron

Technical rept. no. 24,
by M. Shinozuka. May 64, 17p
Contract Nonr266 78, Proj. NR064 446
Unclassified report

Descriptors: (*Viscoelasticity, Analysis), Stresses, Mathematical analysis, Relaxation time, Strain (Mechanics), Theory, Thermal properties, Time.

For linear stress analysis of homogeneous, isotropic, thermorheologically simple viscoelastic materials, the hypothesis of temperature-time equivalence is stated explicitly with respect to the relaxation spectra. Because relaxation spectra among the various viscoelastic functions are most closely related to the molecular processes occurring in the material, the hypothesis stated with respect to spectra is expected to indicate more clearly the validity and limitations of stress-strain relations of thermorheologically simple materials. (Author)

AD-604 029 Div. 25
OTS Prices: HC $3.00/MF $0.75

General Electric Co., West Lynn, Mass.
SEMICONDUCTING COMPOUNDS WITH APPLICATIONS TO THERMOELECTRICITY.
Final rept. for Mar 63-Mar 64,
by R. Vought. Jul 64, 65p
Contract DA44 177AMC2T, Proj. 1A010501B010
TRECOM TR64 35
Unclassified report

Descriptors: (*Semiconductors, Transport properties), (*Thermoelectricity, Energy conversion), Thermal conductivity, Resistance (Electrical), Hall effect, Impurities, Magnesium alloys, Germanium alloys, Tin alloys, Metallic crystals, Crystal lattices.

The report describes work done on a program having the objectives of generating new information on the transport properties of compound semiconductors and of extending the understanding of these materials and their properties. Reliable procedures were established for preparing samples of the system Mg2Ge sub x Sn sub (1-x) with x ranging from 0 to 1, and the peritectic nature of the system was demonstrated. Samples were evaluated by measuring the Seebeck coefficient, electrical resistivity, thermal conductivity and Hall constant. Parameters of interest to thermoelectric applications were calculated from these experimental quantities. Preliminary evaluations were made of the doping effects of non-stoichiometric magnesium content and of aluminum and indium impurities. A brief discussion is presented of the possibilities of reducing thermal conductivity through magnetic scattering of phonons by phonon-assisted transitions between low-lying levels of electrons in the incomplete 3d or 4f shells of transition metal impurities introduced into the lattice. (Author)

AD-604 033 Div. 25, 1
OTS Prices: HC $2.00/MF $0.50

Stanford Univ., Calif.
IMPERFECTIONS, A MAIN CONTRIBUTOR TO SCATTER IN EXPERIMENTAL VALUES OF BUCKLING LOAD,
by W. H. Horton and S. C. Durham. May 64, 39p
Contract DA44 177AMC115T, Task 1D121401A14176
TRECOM TR64 31
Unclassified report

Descriptors: (*Structural shells, Buckling (Mechanics)), (*Airframes, Buckling (Mechanics)), (*Buckling (Mechanics), Test methods), Cylindrical bodies, Mandrels, Elasticity, Loading (Mechanics), Deformation, Experimental data.

The paper develops a novel approach for testing cylindrical shells. A method of buckle restriction by an internal mandrel located at a distance of one wall thickness from the surface of the shell is used. By means of this device, it is possible to buckle the shell elastically until the shell is completely filled with buckles. It is shown that the variation of the rate of change in number of buckles as a function of the applied load follows a Gaussian distribution. The mode of the Gaussian curve is located at a load level which agrees very closely with the critical buckling load computed from the classic formula. It is considered that the evidence presented is substantial support for the small displacement theory and a strong indication that buckling takes place first at the weakest section of the shell and that the amount of buckling is a function of the area of weakness. (Author)

AD-604 034 Div. 25, 15
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
REPORT TO THE PLENARY SESSION OF THE CONFERENCE OF HIGHER EDUCATIONAL INSTITUTIONS ON THE SIMILARITY THEORY AND ITS APPLICATION IN HEAT ENGINEERING,
by S. G. Teletov. 28 Jul 64, 20p
RSIC 234; TT 64 71213
Unclassified report

Trans. of Moskovskii Institut Inzhenerov Zheleznodorozhnogo Transporta. Trudy (USSR) 1961, no. 139, p. 31-44.

Descriptors: (*Heat, Mathematical analysis), (*Equations, Heat), Motion, Numerical analysis, Engineering, Symposia, USSR.

AD-604 038 Div. 25
OTS Prices: HC $2.00/MF $0.50

Hughes Research Labs., Malibu, Calif.
LASER DEVICES EXPLORATORY INVESTIGATION.
Interim Engineering Rept. no. 5, 1 May-31 Jul 64,
by H. V. Winston. 31 Jul 64, 28p
Contract AF33 657 11650
Unclassified report

Descriptors: (*Lasers, Materials), (*Semiconductor devices, Lasers), Optical equipment components, Pumping (Electronics), Finishes and finishing, Flash lamps, Crystal growth, Yttrium compounds, Oxides, Lanthanum compounds, Fluorides, Impurities, Optical properties, Microwave spectroscopy, Aromatic compounds, Ruby, Raman spectroscopy, Dielectrics.

Quarter-wave plates for a longitudinal mode selector were completed (see AD-600 267). Evaluation of a liquid-nitrogen-cooled pumping configuration for ruby has shown that the over-all efficiency is lower than for a room-temperature system despite a 40% lowering of threshold. Therefore, attention is given to the further improvement of noncryogenic systems, including the effects of multiple ellipse cavities, improved optical finish, and cooling to 0C. The efficiencies of several useful linear flash lamps were measured. Equipment for the growth of yttrium oxide was modified and is ready for operation. Doped lanthanum fluoride of excellent optical quality was prepared and used for optical and microwave studies. Improvements in the mode control of giant pulse lasers have resulted in significant changes in the anti-Stokes emission in benzene. Thresholds and conversion efficiencies for the production of stimulated Raman scattering were measured, and the production of damage in transparent dielectric materials was investigated. (Author)

Descriptors: (*Superconductors, Tunneling (Electronics)), (*Tunneling (Electronics), Superconductors), Superconductivity, Electric currents, Voltage, Niobium, Niobium compounds, Oxides, Indium, Sandwich construction, Foils, Films, Magnetic fields, Resonance.

A study was made of the two-superconductor tunneling characteristics of sandwiches of Nb-Nb Oxide-In. Observation was of not only the dc Josephson effect (a zero-voltage tunneling supercurrent), but also, at finite voltages, dc current peaks of comparable magnitude. A similar effect has been seen in junctions exhibiting dc zero-voltage currents apparently due to low critical current superconducting shorts.

AD-604 099 Div. 25, 15
OTS Prices: HC $1.00/MF $0.50

Rochester Univ., N. Y.
SINGULAR LOGARITHMIC POTENTIALS AND PERATIZATION,
by H. H. Aly, Riazuddin, and A. H. Zimerman.
24 Jun 64, 11p UR-875-42
Contract AT30 1 875

Unclassified report

Descriptors: (*Field theory, Mathematical analysis), (*Numerical methods and procedures, Field theory), Potential theory, Series, Perturbation theory, Equations, Quantum mechanics.

Logarithmic singular potentials are considered to test the applicability of the peratization technique. It is shown that if one sums up the leading singular terms in each order of the perturbation series no finite results can be obtained. (Author)

AD-604 100 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
REFLECTIVE TYPE LASER AMPLIFIER,
by H. Jacobs, D. A. Holmes, L. Hatkin, and F. A. Brand. Jun 64, 28p
Task 1G6 22001A056 03 00
AELRDL TR2467

Unclassified report

Descriptors: (*Lasers, Design), Ruby, Silver, Reflectors, Electromagnetic waves, Propagation, Air, Attenuation, Gain, Oscillation, Metal coatings, Mathematical analysis, Crystals, Pumping (Electronics), Electromagnetism, Equations, Reflection.

Calculations have been carried out in an analysis of a reflection type laser amplifier. Electromagnetic radiation is assumed to travel at normal incidence through a system composed of air, a partially transmitting silver reflector, active media such as ruby, and a thick silver reflector. The analysis is facilitated by considering the ruby as a medium with an effective negative conductivity resulting in the growth of the wave during propagation. Highest gains are obtained with the front mirror completely removed, since losses resulting from a skin effect mechanism cut down the useful power output. In the system consisting of air, ruby and metal, the presence of the rear metal reflector decreases the attenuation factor required for maximum gain to almost half the value required for a completely transmitting system consisting of air, ruby, and air. (Author)

AD-604 123 Div. 25, 9
OTS Prices: HC $1.00/MF $0.50

Hartford Univ., Conn. Research Inst.
THE TRANSMISSION OF SOUND IN A MOVING FLUID.
Rept no. 3.
14 Aug 64, 17p
Contract Nonr4301 00, Proj. NR185 802

Unclassified report

Descriptors: (*Noise, Measurement), (*Sound transmission, Fluid flow), (*Fluid flow, Sound transmission), Pipes, Turbulence, Frequency, Hydrophones, Spectrum analyzers.

The report is concerned directly with relating the problem of system noise (turbulence) to one important goal of the project; that is, to impart any desired discrete frequency signal into a moving fluid, to detect and measure this signal, and to determine what effect a mechanical device placed in the channel has on the input signal. (Author)

AD-604 164 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONSTANT STRAIN WAVES IN STRINGS,
by J. D. Cole, C. B. Dougherty, and J. H. Huth.
12 Jan 53, 12p P-359

Unclassified report

Descriptors: (*Strain (Mechanics), Mechanical waves), (*Mechanical waves, Propagation), Velocity, Differential equations, Integration, Reflection, Deflection, Functions.

A non-linear theory is developed for constant-strain waves in elastic strings. The speed of longitudinal and transverse waves is related to the strain and tension. The results can be used to calculate tension due to impact and thus breaking loads. Some generalizations are suggested. (Author)

AD-604 168 Div. 25
OTS Prices: HC $5.00/MF $1.00

Tennessee Univ., Knoxville.
AN EXAMINATION OF THE FAR INFRARED SPECTRUM OF HYDROGEN FLUORIDE.
Scientific rept. no. 5,
by Arthur Allen Mason and Alvin H. Nielsen.
Aug 63, 156p
Contract AF19 604 7981, Proj. 7670, Task 767002
AFCRL 63 863

Unclassified report

Submitted as a dissertation for Ph.D. in Physics.

Descriptors: (*Fluorides, Infrared spectroscopy), (*Hydrogen compounds, Infrared spectroscopy), (*Spectrum analyzers, Instrumentation), Spectra (Infrared), Line spectrum, Molecular spectroscopy, Molecular rotation. Frequency.

The purpose of the investigation was to determine the frequencies, the ground state rotational constants, the intensities, and the half widths of as many of the pure rotational absorption lines of hydrogen fluoride as could be measured. The problem, in part, required the development of a far infrared spectrometer. This was accomplished by the redesign and reconstruction of a Perkin-Elmer Model 12B prism instrument. The general techniques of far infrared instrumentation are discussed in detail and their application to this particular instrument explained. The vacuum wave numbers of the line centers of the first seventeen lines of the pure rotational spectrum of hydrogen fluoride were measured. These lines map the region between 41.08 cm(-1) and 658.54 cm(-1). The equivalent widths for fifteen lines were measured at several different

beam with a resonant plasma and coupling this radiated energy directly into a waveguide or a coaxial line. This experiment is based on theoretical studies which covered the interaction of space charge waves with fully ionized resonant plasmas. A standard 9 Gc electron gun and helix configuration was utilized to produce and feed a velocity modulated electron beam into a magnetically compressed, resonant plasma generated in mercury vapor. The work done indicates that fast wave conversion will work best at the higher frequencies since the interaction length will be shorter and more probable of being achieved in a plasma.

AD-604 089 Div. 25, 4
OTS Prices: HC $2.00/MF $0.50

California Univ., Berkeley.
DEPENDENCE OF SPIN-LATTICE RELAXATION TIME UPON MAGNETIC FIELD FOR TWO SALTS OF NEODYMIUM.
Technical rept. no. 15,
by J. M. Baker and N. C. Ford, Jr. Aug 64, 43p
Contract Nonr222 61, Proj. NR018 408
Unclassified report

Work partly supported by the U. S. Atomic Energy Commission.

Descriptors: (*Neodymium, Relaxation time), (*Crystal lattices, Impurities), (*Lanthanum compounds, Crystal lattices), Fluorides, Nitrates, Magnesium compounds, Ions, Microwave spectroscopy, Paramagnetic resonance, Nuclear spins, Electron ttransitions, Selection rules, Phonons, Paramagnetic materials, Hyperfine structure, Magnetic fields.

Measurements were made below 1.5K of the spin-lattice relaxation rate of Nd(3+) in lanthanum fluoride and lanthanum magnesium nitrate as a function of the separation of the levels of the gound doublet. The relaxation rate for the forbidden transistion was calculated, and it has been shown that under certain circumstances it can be more rapid than the relaxation rate for allowed transitions. There is an additional tribution which depends upon the concentration of Nd(3+) and may be due to cross relaxation to coupled pairs of Nd(3+) ions. In lanthanum magnesium nitrate there is a phonon bottleneck as well as the direct process. Both salts show an Orbach process above 2K. A modification of the usual pulse saturation technique was used to obtain these measurements which gives some advantages over the standard method. (Author)

AD-604 090 Div. 25, 4
OTS Prices: HC $2.00/MF $0.50

California Univ., Berkeley.
NON-DIPOLAR INTERACTION BETWEEN NEAREST NEIGHBOR NEODYMIUM IONS IN THE ETHYL SULFATE.
Technical rept. no. 12,
by J. M. Baker. Aug 64, 33p
Contract Nonr222 61, Proj. NR018 408
Unclassified report

Work partly supported by the U. S. Atomic Energy Commission.

Descriptors: (*Neodymium, Electric moments), (*Crystal lattices, Impurities), (*Lanthanum compounds, Crystal lattices), Metalorganic compounds, Sulfates, Ions, Microwave spectroscopy, Paramagnetic resonance, Exchange reactions, Dipole moments, Quadrupole moments, Phonons, Electron transitions, Hyperfine structure.

Measurements made on the EPR spectrum of a pair of interacting nearest neighbor neodymium ions in lanthanum ethyl sulphate show that the interaction is predominantly dipolar; but that there is also a non-dipolar interaction. A semiquantitative discussion is given of the possible origins of this non-dipolar contribution including superexchange, electric quadrupole-quadrupole, and virtual phonon exchange interactions. (Author)

AD-604 091 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

California Univ., Berkeley.
ELECTRIC QUADRUPOLE-QUADRUPOLE INTERACTION IN CERIUM ETHYL SULFATE.
Technical rept. no. 13,
by J. M. Baker. Aug 64, 18p
Contract Nonr222 61, Proj. NR018 408
Unclassified report

Work partly supported by the U. S. Atomic Energy Commission.

Descriptors: (*Cerium compounds, Electric moments), (*Crystal lattices, Electric moments), Metalorganic compounds, Sulfates, Specific heat, Dipole moments, Quadrupole moments, Nuclear spins, Phonons, Microwave spectroscopy, Paramagnetic resonance, Electron transitions, Impurities, Gadolinium, Europium.

Some EPR measurements on cerium ethyl sulfate are reported which show that in addition to the classical dipole-dipole interaction, there is between nearest neighbor ions a large interation which is believed to be due to quadrupole-quadrupole interaction.

AD-604 092 Div. 25
OTS Prices: HC $1.00/MF $0.50

California Univ., Berkeley.
DYNAMIC NUCLEAR POLARIZATION IN CRYSTALS.
Technical rept. no. 14,
by C. D. Jeffries. Aug 64 22p
Contract Nonr222 61, Proj. NR018 408
Unclassified report

Lecture presented at a Discussion Meeting of the Royal Society, London, 21 May 64. Research partly supported by the U. S. Atomic Energy Commission.

Descriptors: (*Crystal lattices, Polarization), (*Lanthanum compounds, Crystal lattices), Nuclear spins, Nuclear magnetic resonance, Resonance absorption, Relaxation time, Electrons, Ions, Protons, Proton beams, Microwave spectroscopy, Excitation, Nitrates, Magnesium compounds.

The paper is concerned with a system of nuclear spins in coupling with electron spins in a solid, and the possibility of appreciably polarizing the nuclear spins through excitation of the magnetic resonances of the system. This is an example of a dynamic polarization method in which the nuclei are polarized directly by inducing certain forbidden microwave transitions. Applications to polarized proton targets are discussed.

AD-604 097 Div. 25
OTS Prices: HC $1.00/MF $0.50

Coordinated Science Lab., Univ. of Illinois, Urbana.
ANOMALOUS CURRENT PEAKS IN THE 1-V CHARACTERISTIC FOR TUNNELING BETWEEN TWO SUPERCONDUCTORS,
by M. G. Craford, R. N. Peacock, R. P. Ries, and C. B. Satterthwaite. Aug 64, 10p CSL-R-232
Contract DA28 043AMC00073E Unclassified report

The equations of linear couple stress elasticity are applied to solve the torsion problem for a circular cylinder. It is found that the torsional rigidity of very fine wires will be greater than predicted by the classical theory of elasticity. (Author)

AD-604 199 Div. 25
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
ATTENUATION OF GAMMA RAYS. I. TRANSMISSION VALUES FOR FINITE SLABS OF LEAD, IRON, AND THE COMPTON SCATTERER,
by Glenn H. Peebles. 23 Jan 53, 79p P-368
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Gamma rays, Attenuation), (*Attenuation, Gamma rays), Lead, Iron, Scattering, Reflection, Air, Photoelectric effect, Compton scattering, Photons.

An approximate integral recursion formula is developed which gives a relation between the probability that a photon will be transmitted through a slab of finite thickness with exactly k + 1 collisions and the probability that it will be transmitted with exactly k collisions, where the latter probability is known for suitable ranges of slab thickness, of incident energy, and of incident angle. A similar formula also exists for the expected energy transmitted. The two recursion formulas have been used to calculate the transmissions with one, two, and three scatterings for photons incident on slabs of lead and of iron, and from these calculated transmissions the 'build-up' factors have been estimated. A second method, which considers the transmission through a thick slab as a succession of transmissions through thin slabs, is used to check the estimates of the build-up factor obtained by the first method. (Author)

AD-604 200 Div. 25
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ATTENUATION OF GAMMA RAYS. II. TRANSMISSION VALUES FOR VARIOUS MATERIALS AND GEOMETRIES,
by Glenn H. Peebles. 18 Mar 53, 54p P-368
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Gamma rays, Attenuation), (*Attenuation, Gamma rays), Absorption, Probability, Metals, Scattering, Photoelectric effect, Pair production, Iron, Lead, Photons.

A discussion of the effect of variation of the total absorption coefficient on gamma-ray-transmission probabilities is given, which leads to estimates of the build-up factors for a material of arbitrary atomic number Z. Estimates are made of the photon and energy densities arising from a plane of sources, a line of sources, and a point source in an infinite homogeneous medium, where the material of the medium is (1) iron and (2) lead. (Author)

AD-604 247 Div. 25
OTS Prices: HC $3.00/MF $0.50

Antenna Lab., Ohio State Univ. Research Foundation, Columbus
A STUDY OF AN OPTICAL SPATIAL FILTER SYSTEM. Master's thesis,
by Charles T. Bunnell. 6 Apr 64, 54p OSURF-1222-14
Contract AF33 616 7843, Proj. 4144, Task 414408
Unclassified report

Descriptors: (*Optical filters, Performance (Engineering), Misalignment, Mercury lamps, Monochromatic light, Lenses, Optical images, Spectra (Visible and Ultraviolet), Cameras, Optics, Diffraction, Integral transforms, Mathematical analysis, Errors, Alignment, Optical equipment.

A study was made to analyze the nature of errors introduced by various components of an optical spatial filter system. Errors due to improperly positioned apparatus are quite evident and easily corrected. Phase errors are also quite evident but are more difficult to remove. (Author)

AD-604 273 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Frick Chemical Lab., Princeton Univ., N. J.
NEW CRYOGENIC METHOD FOR RAMAN STUDIES OF MOLECULAR CRYSTALS.
Technical rept. no. 17,
by R. Savoie and A. Anderson. Jul 64, 16p
Contract Nonr1858 27, Proj. NR014 203
Unclassified report

Descriptors: (*Crystal growth, Cryogenics), (*Raman spectroscopy, Crystals), Liquefied gases, Cryostats, Single crystals, Ammonia, Sulfur compounds, Dioxides, Methane, Hydrochloric acid, Hydrogen compounds, Bromides, Scattering, Molecular association.

A new technique has been developed for growing good quality molecular crystals, suitable for Raman studies at low temperatures. The method utilizes a copper rod, cooled by a suitable refrigerant, which lies axially in the sample tube. The crystal grows radially around the rod from the melt. Liquid nitrogen and helium cryostats, incorporating this method, for use with the Cary 81 Spectrophotometer, are described. These can be readily modified to suit other Raman instruments. Low Rayleigh scattering near the exciting line and the very sharp spectral lines of a number of samples so far studied indicate the good quality of such crystals, grown in a relatively short time. (Author)

AD-604 292 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
IMPULSIVE LOADING ON AN ELASTIC HALF-PLANE,
by J. D. Cole and J. H. Huth. 14 Dec 53, 7p P-467
Unclassified report

Descriptors: (*Structural parts, Loading (Mechanics)), Elasticity, Mechanical waves, Shear stresses, Integral transforms, Integral equations, Acoustic properties.

Consideration is given to the wave system resulting from a step loading on an elastic half-space. The stresses in a one dimensional 'head' are given exactly. The maximum width of this 'head' is 2r sub 0, and its depth along the axis falls off like 1/z sub 2 for large z. However the magnitude of the stresses within the 'head' remain constant. This one dimensional 'head' could be of considerable importance in spalling problems. Integrals representing reflected waves can be obtained and treated by the same method. (Author)

AD-604 303 Div. 25
OTS Prices: HC $1.00/MF $0.50

pressures and found to be directly proportional to the pressure over the range of measurement. (Author)

AD-604 175 Div. 25, 15
OTS Prices: HC $1.00/MF $0.50

Institute of Engineering Research. Univ. of California, Berkeley.
A STATIC-GEOMETRIC ANALOGUE IN THE THEORY OF COUPLE-STRESSES,
by P. M. Naghdi. Jul 64, 10p AM-64-12
Contract Nonr222 81, Proj. NR064 449
Unclassified report

Descriptors: (*Continuum mechanics, Stresses), (*Stresses, Continuum mechanics), Functions, Statics, Geometry, Analog systems, Elastic shells, Theory, Equations, Deformation, Tensor analysis.

A static-geometric analogue is established in the presence of couple-stresses, using the appropriate three-dimensional equations of equilibrium and compatibility for infinitesimal deformation. In the non-polar case, the analogue degenerates merely to the representation of the symmetric stress tensor in terms of a Gwyther-Finzi stress function. (Author)

AD-604 177 Div. 25
OTS Prices: HC $2.00/MF $0.50

Stanford Univ., Calif.
REFLECTION AND TRANSMISSION BY LAYERED CRYSTAL STRUCTURES.
Technical rept. no. 2,
by Harold Levine. 30 Jul 64, 27p
Contract Nonr225 74, Proj. NR041 313
Unclassified report

Descriptors: (*Crystal lattices, Optical properties), Crystal structure, Scattering, Reflection, Wave transmission, X-ray diffraction analysis, Electron diffraction analysis, Mathematical analysis.

AD-604 178 Div. 25
OTS Prices: HC $2.00/MF $0.50

California Univ., La Jolla.
RESISTIVITY OF SOLID AND LIQUID SODIUM.
Technical rept. no. 2,
by W. Kohn and Michael P. Greene. 4 Aug 64, 38p
Contract Nonr2216 11, Proj. NR017 630
Unclassified report

Descriptors: (*Sodium, Resistance (Electrical)), Liquid metals, Solids, Ions, Neutron scattering, Phase shift, Phonons, Electrons, Phase studies.

A theoretical study was made of the resistivity of solid and liquid sodium. Inelastic neutron scattering data were utilized to obtain the required information about the dynamics of the ions. The electron phonon interaction is characterized by phase-shifts, two of which are used as adjustable parameters. Although the calculation is believed to incorporate accurately many body effects, Umklapp processes, time dependent effects, etc. agreement with experiment is disappointing. The calculated resistivity exceeds the experimentally measured values by a factor of the order of 2 at low temperatures, and above the melting point there are again discrepancies of this order. No convincing explanation of these disagreements was found. (Author)

AD-604 181 Div. 25, 4
OTS Prices: HC $2.00/MF $0.50

Michigan Univ., Ann Arbor. Coll. of Engineering.
VANADIUM SOLID-STATE CHEMISTRY BY PARAMAGNETIC RESONANCE.
Technical rept.,
by C. Kikuchi and N. Mahootian. Jul 64, 45p
ORA-06029-2-T
Contract DA49 186AMC80x, Proj. 06029
Unclassified report

Descriptors: (*Vanadium, Paramagnetic resonance), (*Crystal lattices, Impurities), Nuclear magnetic resonance, Nuclear spins, Valence, Atomic orbitals, Atomic energy levels, Sapphire, Salts, Calcium compounds, Magnesium compounds, Aluminum compounds, Oxides, Solid state physics.

A brief review of the electron spin resonance properties of vanadium in crystalline solids, such as in sapphire, Tutton salt, and magnesium oxide, is given. (Author)

AD-604 183 Div. 25
OTS Prices: HC $2.00/MF $0.50

Honeywell Research Center, Hopkins, Minn.
PLASTIC DEFORMATION OF CALCIUM TUNGSTATE SINGLE CRYSTALS,
Technical rept. no. 26,
by A. Arbel and R. J. Stokes. Jul 64, 39p HR-64-275
Contract Nonr4076 00, Proj. NRO32 451
Unclassified report

Descriptors: (*Calcium compounds, Tungstates), (*Tungstates, Calcium compounds), (*Crystal lattice defects, Tungstates), Crystal substructure, Compressive properties, Deformation, Plasticity, Shear stresses, Brittleness, Thermal properties, Chemical bonds, Lasers, Materials, Single crystals.

Calcium tungstate deforms by slip on the (001) <100> system above 400C. Simple shear over this plane is the only deformation mode observed under compression at temperatures up to 900C and a strain rate of 0.0010 sec(-1). The critical resolved shear stress is strongly temperature dependent. Crystals cannot be plastically deformed at room temperature, at 400C they are still quite brittle but by 900C they are soft (yield stress, 500 psi) and plastic. Slip traces at all temperatures are fine and straight but those produced at lower temperatures (600-700C) have a greater surface tilt and are more sharply defined than those produced above 800C. This is due to fewer dislocation sources and restrictions on dislocation multiplication at lower temperatures. The role of bonding and crystal structure in the selection of slip parameters is discussed. It is considered that the stacking of the oxygen ions is the dominant factor dictating the slip plane and slip direction. (Author)

AD-604 189 Div. 25
OTS Prices: HC $1.00/MF $0.50

Honeywell Research Center, Hopkins, Minn.
TORSION OF A CIRCULAR CYLINDER IN COUPLE STRESS ELASTICITY.
Technical rept. no. 25,
by H. Cohen. Jul 64, 11p HR-64-274
Contract Nonr4076 00, Proj. NR032 451
Unclassified report

Descriptors: (*Stresses, Cylindrical bodies), (*Wires, Elasticity), Mathematical analysis, Equations.

26. Production and Management

AD-603 525 Div. 26, 30
OTS Prices: HC $1.00/MF $0.50

Cooley Electronics Lab., Univ. of Michigan, Ann Arbor.
COMPUTATIONAL TECHNIQUES FOR SCHEDULING PROBLEMS WITH DEFERRAL COSTS.
Technical rept., no. 140,
by E. L. Lawler. Apr 64, 22p ORA-04967-1-T
Contract AF30 602 2661

Unclassified report

Descriptors: (*Scheduling, Mathematical programming), (*Dynamic programming, Scheduling), (*Linear programming, Scheduling), Optimization, Costs, Operations research, Management engineering, Time studies, Programming (Computers).

A class of scheduling problems involving deferral costs has been formulated by McNaughton, who has described a simple method of solution for the linear, single-processor case. In this report dynamic programming and linear programming techniques are applied to nonlinear and multiple-processor problems. A dynamic programming solution of the nonlinear, single-processor problem is possible, proveded the number of jobs is small. Transportation methods of linear programming can be used to solve large nonlinear, multiple-processor problems, provided the processing times for the jobs are equal. Approximate and/or partial solutions are possible for other cases. (Author)

AD-603 536 Div. 26, 17, 22
OTS Prices: HC $3.00/MF $0.75

Springfield Armory, Mass.
EXPERIMENTAL ELECTROMAGNETIC TEST METHODS FOR THE NONDESTRUCTIVE EVALUATION OF CARBURIZED STEEL PARTS,
by H. P. Hatch and K. A. Fowler. 29 Apr 64, 72p
Proj. AW3BA603
SA TR19 1509

Unclassified report

Descriptors: (*Gun components, Steel), (*Steel, Electromagnetic properties), (*Non-destructive testing, Steel), Carbon, Carbides, Austenite, Test methods, Test equipment (Electronics), Voltage, Coils, Electric bridges, Heat treatment, Phase measurement, Ferromagnetism, Microstructure, Magnetic properties.

Several experimental electromagnetic test methods were investigated for application to the nondestructive evaluation of carburized steel parts. The results of the study indicate that an accurate and rapid measure of the case depth of carburized parts can be made based on measurements of the phase of the third harmonic component of the secondary test coil voltage. This test parameter can be relatively insensitive to certain normal process variables. An a.c. inductance bridge was used to obtain measurements indicative of the tempering temperature and free ferrite content of the part. The results of an investigation concerning the influence of retained austenite and residual stress on the magnetic comparator evaluation of carburized steel samples are also reported. Experimental procedures are outlined and results are discussed in terms of potential applications to nondestructive testing problems. (Author)

AD-603 694 Div. 26, 17
OTS Prices: HC $6.00/MF $1.50

Battelle Memorial Inst., Columbus, Ohio.
DESIGN, PERFORMANCE, FABRICATION, AND MATERIAL CONSIDERATIONS FOR HIGH-PRESSURE VESSELS,
by E. J. Mills, T. J. Atterbury, L. M. Cassidy, R. J. Eiber, and A. R. Duffy. 30 Mar 64, 286p
Contract DA01 021AMC203Z
RSIC 173

Unclassified report

Descriptors: (*Pressure vessels, Manufacturing methods), (*Welding, Pressure vessels), Structures, Design, Performance (Engineering), Loading (Mechanics), Carbon alloys, Steel, Stainless steel, Maraging steels, Mathematical analysis, Titanium alloys, Aluminum alloys, Nickel alloys, Cladding, Welds, Airborne, Mechanical properties, Stresses, Radiography, Biobliographies, Non-destructive testing.

Bottles and tanks for high pressures of 5000 pounds per square inch and above are discussed under the classifications of design, performance, fabrication, and material considerations. Single-walled, multilayered, and banded pressure vessels are considered together with manufacturing methods. Test procedures and fracture initiation and propagation are discussed and analyzed. Consideration is also given to materials and specifications. (Author)

AD-603 733 Div. 26, 17
OTS Prices: HC $4.00/MF $0.75

Aluminum Co. of America, New Kensington, Pa.
INVESTIGATION TOWARD OBTAINING SIGNIFICANTLY HIGHER MECHANICAL PROPERTIES OF AS-WELDED JOINTS IN HIGH-STRENGTH, HEAT-TREATABLE ALUMINUM ALLOYS.
Final rept.,
by James R. Terrill. 30 Jul 64, 116p Alcoa 2-64-16
Contract DA36 034ORD3237A, Proj. 1H 0 24401A11 01

Unclassified report

Descriptors: (*Welds, Aluminum alloys), (*Aluminum alloys, Arc welds), (*Arc welding, Aluminum alloys), Sheets, Heat treatment, Aging (Materials), Tensile properties, Corrosion, Stresses, Magnesium alloys, Zinc alloys, Microstructure, Tests, Metal joints, Tables, Fracture (Mechanics), Failure (Mechanics), Welding rods.

This report describes the investigations on local heat treating of welds, bead contour studies, and weldability of controlled composition Al-Zn-Mg alloys. (Author)

AD-603 760 Div. 26, 12, 17
OTS Prices: HC $3.00/MF $0.50

Norair Div., Northrop Corp., Hawthorne, Calif.
DEVELOPMENT OF MANUFACTURING CAPABILITY FOR PRODUCING HIGH PERFORMANCE ALUMINUM AND MAGNESIUM ALLOY CASTINGS.
Quarterly progress rept. no. 1, 1 May-31 Jul 64,
by A. J. Iler. Aug 64, 55p NOR-64-204
Contract AF33 615 1341, Proj. 8 119

Unclassified report

Descriptors: (*Aluminum alloys, Castings), (*Magnesium alloys, Castings), (*Castings, Spacecraft), (*Casting alloys, Mechanical properties), Casting, Performance (Engineering), Manufacturing methods, Molding, Land, Clay, Tensile properties, Crystal structure, Grain structure (Metallurgy).

This report considers: (a) Development and evaluation of foundry processing methods as related to the most advanced foundry techniques, with further development of those factors offering the most potential to achieve the

RAND Corp., Santa Monica, Calif.
W. K. B. APPROXIMATION THROUGH THE TURNING POINT,
by A. A. Broyles. 15 Feb 54, 11p P-488
Unclassified report

Descriptors: (*Quantum mechanics, Hydrogen), (*Hydrogen, Atomic properties), Atoms, Harmonic oscillators, Functions, Differential equations, Harmonic analysis.

Approximations to solution of the radial one particle Schroedinger wave equation for hydrogen bound states were investigated and compared to the original Wentzel, Kramers, Brillouin (W. K. B.) approximation. A modification of the W. K. B. formulas to allow them to pass through turning points and an approximation involving simple harmonic oscillator wave functions were used. Normalization was accomplished by a means similar to the correspondence principle normalization of W. K. B. The accurate solutions may be reproduced to within 5 percent by these approximations. The simple harmonic oscillator functions seem to give the most satisfactory solutions for most cases. (Author)

AD-604 310 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NOTE ON THE RELATIVISTIC THOMAS-FERMI ATOM MODEL,
by J. J. Gilvarry. 1 Apr 54, 5p P-500
Unclassified report

Descriptors: (*Atomic structure, Relativity theory), (*Relativity theory, Atomic structure), Field theory, Atomic orbitals, Atomic energy levels, Mass-energy relation, Perturbation theory, Differential equations, Mathematical models, Nuclear shell models.

It is shown that an expression for the density of states derived from the Dirac wave equation for a central field removes the convergence difficulties in the usual relativistic Thomas-Fermi equation. (Author)

AD-604 073 Div. 26
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TRENDS IN SOVIET INDUSTRIAL PRODUCTIVITY,
by Walter Galenson. 6 Mar 52, 31p P-276
Unclassified report

Descriptors: (*Industrial production, USSR), Economics, Industries, United States, Labor, Statistical analysis, History.

Russian statistics indicate an annual rate of growth (compounded) of productivity, for manufacturing and mining, of 10.3 per cent from 1928 to 1940. Other data indicate, however, that this figure would be much smaller if computed in accordance with conventional American techniques. Very substantial productivity gains were achieved under the prewar Five Year Plans, with heavy industry leading the way and the consumer goods industries lagging far behind. On the basis of comparisons of physical output per wage earner for a series of industries, for years immediately preceding World War II, it was concluded that, very roughly, Russian industry in 1939 stood at 40 per cent of the American labor productivity level. There was wide variation among industries. The Russians claim that their average rate of productivity growth from 1946 to 1950 was 13.25 per cent, and that by 1950, average industrial labor productivity exceeded the 1940 level by 37 per cent. A gain on the order of from 5 to 10 per cent over 1940 would appear to be more realistic.

AD-604 076 Div. 26, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE 'POLICY SCIENCES': ASPIRATION AND OUTLOOK,
by Paul Kecskemeti. 1 Apr 52, 26p P-287
Unclassified report

Descriptors: (*Management planning, Theory), Sociology, Verbal behavior, Probability, Culture, Political science, Leadership, Scientific research, Management engineering, Social sciences, Decision making.

AD-604 172 Div. 26, 14, 17
OTS Prices: HC $5.00/MF $1.00

IIT Research Inst., Chicago, Ill.
DEVELOPMENT OF IMPROVED LINER FOR EXTRUSION BILLET CONTAINERS.
Final rept. for 5 Jun 62-5 Jan 64,
by Sheldon A. Spachner. May 64, 173p IITRI-B244-18
Contract AF33 657 8784, Proj. 7 945
ML TDR64 194
Unclassified report

Descriptors: (*Heat resistant materials, Metal-forming presses), (*Metal-forming presses, Extrusion), (*Extrusion, Metal-forming presses), (*Containers, Metal-forming presses), Tool steel, Ceramic coatings, Ceramic materials, Composite materials, Reinforcing materials, Fibers, Aluminum compounds, Oxides, Molybdenum, Nickel alloys, Chromium alloys, Cobalt alloys, Molybdenum alloys, Aluminum alloys, Titanium alloys, Zirconium compounds, Heat-resistant metals and alloys, Refractory coatings, Fiber metallurgy.

A program was carried out to secure an improvement of extrusion container liner performance and life for metal extrusion effected in the 2000 - 3400F temperature range. Liner-support tooling was developed to permit use of superalloy, ceramic-coated tool steel, and solid ceramics as liner materials capable of withstanding 180,000 psi stem pressure. The tooling utilized liner-sleeve assemblies which were not shrink-fitted in the container and could quickly be interchanged. Prototype extrusion liners of Rene 41 and Udimet 700 superalloys, and a variety of both Rokide-process and plasma-arc-ceramic coated liners, were produced and evaluated. Compositions of fiber-metal reinforced ceramic materials specially designed for liner application, were produced and evaluated by extrusion-screening test. A Rokide-process stabilized zirconia ceramic-coated liner withstood TZM alloy extrusion at 3450F. Plasma-arc coatings of stabilized zirconia, and gradated alumina-nickel, and cast Udimet 700 alloy, proved satisfactory for steel extrusion at 2000F. Fiber metal reinforced ceramic mixtures of 72A12O3-28Mo and 59.5A12O3-40.5Mo proved capable of withstanding billet temperatures of 3450F

AD-604 211 Div. 26, 15, 30, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SUB-OPTIMIZATION CRITERIA AND OPERATIONS RESEARCH,
by Roland N. McKean. 22 Apr 53, 21p P-386
Unclassified report

Descriptors: (*Operations research, Standards), Decision making, Optimization, Selection, Measurement, Economics.

The importance of criteria, identifying ends or utility functions, in operations research is discussed. Criteria selection is examined from the viewpoint of sub-optimization. The process of choosing among a relatively narrow list of resource allocations by an administrative level other than the highest.

AD-604 277 Div. 26, 18, 30
OTS Prices: HC $3.00/MF $0.75

Rome Air Development Center, Griffiss AFB, N. Y.
A USER-ORIENTED INFORMATION PROCESSING SYSTEM,
by Frederic A. Dion. Jun 64, 64p
Proj. 4594, Task 459404
RADC TDR64 193
Unclassified report

Descriptors: (*Data processing systems, Management engineering), (*Management engineering, Decision making), Management control systems, Programming (Computers), Computer operators, Cybernetics, Public relations, Real time, Command and control systems, Military intelligence.

The report describes the equipment configuration and programming of an information processing (IP) system which enables managers to direct their operational organizations more effectively. The complete system consists of the manager-user, his experience and knowledge, the organization's personnel, the data processing equipment, its programs and language and the interactions with the outside world. A data processing system is provided for the manager's use which enables him, without prior programming experience, to rapidly and easily manipulate and to operate on the information that he uses in his decision making processes. A system implementation is described which provides the manager-user with a powerful, fast, convenient information processing tool. The user orientation is achieved by programming the system so that the user can operate the data processing portion of the system in a real-time,

advance performance characteristics for Air Force requirements. (b) Selection and evaluation of the most promising magnesium and aluminum base alloys for further development. (Author)

AD-603 801 Div. 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SAMPLING INSPECTION PLANS FOR CONTINUOUS PRODUCTION,
by M. A. Girshick. 10 May 48, 21p P-17
Unclassified report

Descriptors: (*Quality control, Industrial production), (*Industrial production, Quality control), Acceptability, Statistical analysis, Sampling.

The sampling inspection plans discussed are applicable only to a production process in which the units of product are classified as either defective or nondefective. These plans are designed to set a prescribed upper limit to the average outgoing quality of the final product entering into consumption channels. This is accomplished through a sequential process of partial and complete inspection of the finished product which will be described in detail later. Sampling inspection schemes whose aim is to improve the outgoing quality of the finished product is not new in the field of industrial quality control. Various methods are in vogue with varying degrees of statistical validity. The first step towards putting the use of sampling inspection for controlling the outgoing quality on a scientific basis was taken by H. F. Dodge and H. G. Romig of the Bell Telephone system. Dodge and Romig made their inspection plan an adjunct to lot-by-lot acceptance inspection. The basic idea involved in their scheme is briefly described.

AD-603 916 Div. 26, 32
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
SPECIFIC INDUSTRY OUTPUT PROJECTIONS,
by Harold J. Barnett. rev. 1 Sep 51, 60p P-208
Unclassified report

Descriptors: (*Industrial production, Mathematical prediction), Industries, Economics, Statistical analysis, Tables, Management engineering.

AD-603 970 Div. 26
OTS Prices: HC $3.00/MF $0.75

Rocketdyne, Canoga Park, Calif.
INVESTIGATION OF CONDENSING VAPOR LUBRICATED SELF-ACTING JOURNAL BEARINGS.
Final rept for 1 Oct 63-15 Jun 64,
by R. Spies. 1 Jul 64, 86p Rocketdyne-R-5741
Contract Nonr3617 00
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Journal bearings, Lubrication), (*Lubrication, Steam), Condensation, Starting, Vapors, Velocity, Tests, Performance (Engineering), High-temperature research.

A test program on steam-lubricated journal bearings was completed. Grooved and ungrooved bearings were operated over a range of superheat. Performance data were obtained, and the effects of clearance, geometry, load, and speed are discussed. (Author)

AD-603 987 Div. 26, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMPARISONS OF INPUT-OUTPUT AND ALTERNATIVE PROJECTIONS, 1929-39,
by Selma Arrow. 14 Apr 51, 20p P-239
Unclassified report

Descriptors: (*Industrial production, Statistical analysis), (*Economics, Industrial production), Industries, Production, Manufacturing methods, Labor, Costs, Inventory analysis, Tables, Theory, Mathematical prediction.

The four alternative techniques of industrial production forecasting are compared under the hypothesis that all the basic data necessary for each method are available. Thus, in obtaining total output projections by the input-output method, it is assumed that actual final demands are known and in Barnett's regression analysis, that the true gross national products are known.

AD-603 989 Div. 26, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMMENTS ON H. J. BARNETT'S 'SPECIFIC INDUSTRY OUTPUT PROJECTIONS,'
by A. W. Marshall. 1 Oct 51, 6p P-243
Unclassified report

Descriptors: (*Industrial production, Mathematical prediction), Production, Industries, Probability, Economics, Equations, Statistical analysis, Vector analysis, Tables.

Projection methods using input-output tables are compared with Barnett's multiple regression method. An alternative method is suggested using the observed production by industry and the projected production as vectors in n dimensional Euclidean space, and the error of projection as the distance between the two points.

AD-604 055 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Douglas Aircraft Co., Inc., Santa Monica, Calif.
MECHANICAL PROPERTIES TESTS OF WELDED A-356-T6 ALUMINUM ALLOY,
by E. N. Bossing. 20 Apr 64, 13p SM-45949
Unclassified report

Descriptors: (*Aluminum alloys, Welding), (*Welding, Castings), Mechanical properties, Maintenance, Panels (Structural), Magnesium alloys, Heat treatment, Tests, Tensile properties, Welds.

Test of welded areas in heavily chilled A-356-T6 aluminum alloy were conducted to determine feasibility of welding foundry defects. The results showed a mechanical property level commensurate with the retained magnesium content and the soundness of the weld deposit. All sound welds, when heat treated, met the minimum mechanical properties specified for critical areas on the design drawing.

Descriptors: (*Scheduling, Refineries), (*Petroleum industry, Economics), (*Economics, Petroleum industry), Optimization, Mathematical models, Linear systems, Graphics, Nomographs, Operations research, Analysis.

This paper offers a case study in the mathematical methods currently being employed by refinery economics managers. When the analysis is confined to small sections of an integrated operation, the present nomogram techniques appear to be quite adequate. The only disadvantage in relying upon such methods is that they cannot be extended to problems that involve many independent variables.

AD-604 309 Div. 26, 10, 30, 32
OTS Prices: HC $4.00/MF $0.75

RAND Corp., Santa Monica, Calif.
PETROLEUM REFINERY OPERATIONS SCHEDULING. CHAP. VI. CRACKING, RECYCLING, AND BLENDING - AN INTEGRATED REFINERY PROBLEM,
by A. S. Manne. 5 Mar 54, rev. 1 May 54,
114p, P-493

Unclassified report

Descriptors: (*Scheduling, Refineries), (*Petroleum industry, Scheduling), Linear programming, Petroleum, Economics, Costs, Mathematical models, Computers, Numerical analysis, Optimization, Production, Operations research.

This paper is concerned with a simplified version of a hypothetical representative thermal cracking refinery scheduling problem. It was possible to convert into the language of linear programming an engineering analysis that had originally involved numerous non-linearities. The mathematical analysis does not eliminate the fundamental uncertainties facing an oil company but the scheduling calculations do enable the refinery people to present the executive group with a detailed program for dealing with each of several possible contingencies.

AD-604 312 Div. 26, 10, 30, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PETROLEUM REFINERY OPERATIONS SCHEDULING. CHAP. I. INTRODUCTION,
by Alan S. Manne. 19 Mar 54, rev. 1 May 54,
9p P-502

Unclassified report

Descriptors: (*Scheduling, Refineries), (*Petroleum industry,.Scheduling), Economics, Operations research, Computers, Mathematics, Dictionaries, Production, Costs.

This report introduces the use of mathematical economics in representative oil refinery scheduling problems. A glossary of technical terms is presented.

AD-604 313 Div. 26, 10, 30, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PETROLEUM REFINERY OPERATIONS SCHEDULING. CHAP. VII. THE ECONOMIST AND THE OPERATIONS SCHEDULER,
by A. S. Manne. 22 Mar 54, rev. 1 May 54, 5p P-503

Unclassified report

Descriptors: (*Scheduling, Refineries), (*Petroleum industry, Scheduling), Economics, Graphics, Linear programming, Nonlinear programming, Production, Operations research.

In applying mathematical economics to the operation of business activities, the following questions are briefly examined: What is the econometrician currently able and unable to contribute to the refinery programming problem, and, what can the economist learn about the refinery operator.

on-line fashion. The system permits the user to manipulate and to operate on, in any legitimate way, the information necessary for his decision making. (Author)

AD-604 284 Div. 26, 15, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME COMBINATORIAL PROBLEMS ARISING IN THE THEORY OF MULTI-STAGE PROCESSES,
by Richard Bellman and Oliver Gross.
13 Nov 53, 15p P-456

Unclassified report

Descriptors: (*Scheduling, Dynamic programming), (*Dynamic programming, Scheduling), Numerical analysis, Decision theory, Functional analysis, Equations, Operations research, Industrial production.

Using the technique of continuous approximation, approximate solutions to a number of important multi-stage scheduling problems are determined. In addition, the functional equation approach of the theory of dynamic programming is used to derive an alternate proof. (Author)

AD-604 297 Div. 26, 30, 32
OTS Prices: HC $1.00/MF $0.50

Rand Corp., Santa Monica, Calif.
A MOTOR GASOLINE BLENDING PROBLEM,
by A. S. Manne. 25 Jan 54, 3p P-479

Unclassified report

Descriptors: (*Scheduling, Refineries), (*Refineries, Scheduling), Economics, Industrial plants, Gasoline, Operations research, Industrial production.

A gasoline blending problem was selected to provide a case study in the application of mathematical economics to an actual industrial situation.

AD-604 298 Div. 26, 10, 30, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PETROLEUM REFINERY OPERATIONS SCHEDULING. CHAPTER II. CONVENTIONAL METHODS OF REFINERY ECONOMIC ANALYSIS,
by A. S. Manne. 4 Feb 54, rev. 1 May 54, 15p
P-481

Unclassified report

Descriptors: (*Scheduling, Refineries), (*Petroleum industry, Economics), (*Economics, Refineries), Distillation, Costs, Petroleum, Operations research, Analysis.

Economic analysis and costing principles in refinery operations are discussed. The limitations and drawbacks are examined.

AD-604 299 Div. 26, 4, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMPUTATIONAL EXPERIENCE IN SOLVING LINEAR PROGRAMMING PROBLEMS,
by Wm. Orchard-Hays. 15 Mar 54, 21p P-482

Unclassified report

Descriptors: (*Linear programming, Numerical analysis), (*Management planning, Linear programming), Operations research, Refineries, Mathematical models, Programming (Computers), Numerical methods and procedures.

Linear programming techniques for solving administrative and planning problems are discussed. The simplex method is advanced as the most practical way of solving the mathematical problem. The value of the IBM 701 calculator as a computational aid is explored. A petroleum blending problem is used to illustrate the power of linear programming as a tool for planning.

AD-604 301 Div. 26, 10, 30, 32
OTS Prices: HC $2.00/MF $0.50

Rand Corp., Santa Monica, Calif.
PETROLEUM REFINERY OPERATIONS SCHEDULING. CHAPTER III. A CRUDE OIL ALLOCATION PROBLEM,
by Alan S. Manne. 4 Feb 54, rev. 1 May 54,
36p P-484

Unclassified report

Descriptors: (*Scheduling, Refineries), (*Petroleum industry, Scheduling), Mathematical models, Economics, Costs, Petroleum, Mathematical analysis, Optimization, Programmers, Operations research.

This paper presents a simplified analysis of the allocation of crude oils between the various units of multiplant integrated concern. The mathematical technique used takes notice of the net realization estimates that are available in large integrated companies and also handles the question of crude oil availabilities and of primary distillation capacities.

AD-604 302 Div. 26, 10, 30, 32
OTS Prices: HC $3.00/MF $0.75

Rand Corp., Santa Monica, Calif.
PETROLEUM REFINERY OPERATIONS SCHEDULING. CHAPTER V. A GASOLINE BLENDING PROBLEM,
by Alan S. Manne. 12 Feb 54, rev. 1 May 54,
66p P-487

Unclassified report

Descriptors: (*Scheduling, Refineries), (*Petroleum industry, Scheduling), Operations research, Economics, Gasoline, Computers, Linear systems, Mathematical models, Numerical analysis, Partial differential equations, Production.

The selection of an optimal gasoline blending schedule is presented. Assuming fixed availabilities of raw blending materials and of fixed realizations upon finished products, the Union Oil Company's gasoline blending operations were formulated in terms of a constrained-maximum problem. The outstanding result of the numerical analysis was that it would be worth several millions of dollars per annum if the company were able to shift sales so as to sell additional quantities of premium grade gasoline.

AD-604 304 Div. 26, 10, 30, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PETROLEUM REFINERY OPERATIONS SCHEDULING. CHAPTER IV. A NAPHTHA REFORMING PROBLEM,
by Alan S. Manne. 16 Feb 54, rev. 1 May 54,
47p P-489

Unclassified report

variation within type is established for each selected combination of aircraft performance and application requirements. The powerplant is selected on the basis of maximum endurance which, under the method used, is equivalent to minimum total weight of powerplant plus fuel weight. The powerplant spectrum is represented by seven powerplant types; Rocket, Ram Jet, Afterburning Turbojet, Turbojet, Ducted Fan, Turboprop with varying power division between propeller and jet, and Reciprocating. Effects of compressor pressure ratio and turbine inlet temperature on the characteristics of the gas turbine family are considered. (Author)

AD-603 947 Div. 27, 10
OTS Prices: HC $3.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE PROBLEM OF DETERMINING THE OPTIMUM CRITICAL OPERATING PARAMETERS FOR A NONISOBARIC MOTOR WITH DIVERGENT NOZZLE,
by Robert Staniszewski. 4 Aug 64, 56p
FTD TT64 497; TT 64 71209

Unclassified report

Edited trans. of Archiwum Budowy Maszyn (Poland) 1963, v. 10, no. 2, p. 103-140.

Descriptors: (*Rocket motors (Liquid propellant), Performance (Engineering)), Fuel systems, Liquid rocket propellants, Fluid flow, Turbulence, Combustion, Stability, Rocket motor nozzles, Starting, Poland.

A solution is given to the problem of nonsteady state operation of a liquid rocket motor, using the dynamical differential equations of turbulent flow. The solutions are used to determine the optimum and critical parameters, together with the stability limits, on the basis of a nonisobaric motor model. The determination of these parameters makes it possible to correct the design method used for rocket motors. (Author)

AD-604 028 Div. 27
OTS Prices: HC $4.00/MF $0.75

Hiller Aircraft Corp., Palo Alto, Calif.
SUMMARY REPORT ON INVESTIGATION OF MINIATURE VALVELESS PULSE JETS.
Rept. for Jul 60-Jun 62,
by R. M. Lockwood and W. G. Patterson.
Feb 64, 102p ARD-307
Contract DA44 177TC688, Task 1D010501A01405
TRECOM TR64 20

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Pulsejet engines, Research program administration), Fuel injectors, Fuel nozzles, Ignition systems, Fuel systems, Fluid flow, Jet pumps, Jet engine fuels, Thrust augmentor nozzles, Thrust, Heat transfer, High-temperature research, Thermal expansion, Thermal stresses, Army research, Design, Test equipment, Captive tests.

Eleven sizes and configurations of miniature valveless pulsejets were built and tested to determine performance and operational characteristics and to support this report on the general state of the art. When combined with ejector type intermittent jet thrust augmenters, the best performance was achieved with the HH-M1 pulsejet with augmenters, which produced 17 lb thrust with a Tsfc of 1.8 and a thrust augmentation ratio of 1.9. Thrust-to-combustor volume ratio for this basic pulsejet was 140 lb/cubic foot. With augmenters and enclosing shroud, the complete engine package would produce 20 lb/cubic foot. Thrust-to-weight ratios approached 12 to 1. Advantages of simplicity, low cost, and high combustion efficiency and heat transfer rates due to unsteady flow, make these engines well suited for heater-blower applications as well as having some potential for thrust applications. (Author)

27. Propulsion Systems

AD-603 655 Div. 27, 12, 21
OTS Prices: HC $3.00/MF $0.50

General Electric Co., Cincinnati, Ohio.
DYNAMIC SHAFT SEALS IN SPACE.
Quarterly rept. no. 9.
15 Jul 64, 53p
Contract AF33 657 8469

Unclassified report

Descriptors: (*Space propulsion, Seals (Stoppers)), (*Rotary seals, Space propulsion), (*Seals (Stoppers), Liquid metals), Space enviromental conditions, Gas bearings, Thrust bearings, Resonance, Argon, High temperature research, Potassium, Oil seals, Drive shafts, Test facilities, Captive tests.

The objective of the program is to acquire the techniques for sealing high speed rotating shafts under the operating conditions of high temperature liquid metals and vapors, the vacuum environments of space and to provide long seal life. The liquid metal seal rig was completely assembled for preliminary check-out tests. The supporting facilities for these tests were installed and satisfactorily operated. Electromagnetic shake tests of the installed seal rig were carried out. Static tests of the externally pressurized argon gas bearings which carry the seal spindle were carried out for several supply pressures. Dynamic gas bearing evaluation was completed. Dynamic seal evaluation using light turbine oil was also carried out. Reduction of data obtained during experimental evaluation (water) of the squeeze seal configurations was completed.

AD-603 699 Div. 27, 12
OTS Prices: HC $3.00/MF $0.50

Air Force Aero Propulsion Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
RADIAL AND BINORMAL THRUSTING TECHNIQUES FOR MANEUVERING SATELLITES IN NEAR EARTH SPACE.
Rept. for Apr 63-Jan 64,
by Ambrose F. Manikowski. May 64, 56p
APL TDR64 17

Unclassified report

Descriptors: (*Electric propulsion, Maneuvering satellites), (*Maneuvering satellites, Electric propulsion), (*Thrust, Flight control systems), Rendezvous guidance, Space propulsion, Attitude control systems, Orbital trajectories, Performance (Engineering), Equations, Numerical analysis.

The technique of utilizing radial and binormal continuous thrust for changing the position of a vehicle in a near earth orbit has been investigated. This study has shown that maneuvering satellites employing electric propulsion have an advantage over a comparative chemical or cold-gas system for mission times greater than 20 days. When continuous low thrust is used, the error involved in predicting the position of an evasive satellite is approximately 100 miles, more or less, which depends on the height of the orbit and the thrust level involved. The orbital rendezvous maneuver requires a fine degree of control over the position of the rendezvous ship. It appears that radial and binormal continuous thrust can be employed to provide this control function. In addition to the mentioned evasive and rendezvous maneuvering, this technique could be applied to a reconnaissance satellite to fulfill the station-keeping function. (Author)

AD-603 905 Div. 27, 25
OTS Prices: HC $4.00/MF $0.75

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
BASIC PROCESSES OF ION BEAM TERMINATION,
by J. D. Trolinger, J. I. Shipp, and A. E. Lennert.
Aug 64, 114p
Contract AF40 600 1000, Proj. NW2210, Task 695003
AEDC TDR64 105

Unclassified report

Descriptors: (*Electric propulsion, Test facilities), (*Ion beams, Sputtering), (*Sputtering, Ion beams), Ion engines, Secondary emission, Energy, Mathematical models, Vacuum systems, Particle accelerator targets, Crystal structure, Liquid metals.

Theoretical and empirical information necessary for the design of an electrical propulsion test facility collector system complex is compiled. Design considerations which include sputtering, beam accommodation, secondary emission, and less serious secondary effects, are considered in some detail. A theoretical model is presented which accounts for the energy dependence of the sputtering phenomena first at low ion energies and secondly in the region where the Bohr screening parameter is of the order of unity. Based on these functions obtained from the theoretical model in the two regions, an asymptotic empirical relation for the sputtering ratio as a function of ion energy is found to give a satisfactory account of available data. In addition, equations are developed to evaluate the effects of sputtered particles upon vacuum chamber pressure, the amount of flux leaving the target that returns to the engine, and the time required for the target to become saturated with beam particles. Two different collectors, the solid metallic type and a liquid metal system, are evaluated. The advantages and limitations of each are discussed. (Author)

AD-603 917 Div. 27, 1
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
THE GENERALIZED APPROACH TO THE SELECTION OF PROPULSION SYSTEMS FOR AIRCRAFT,
by L. R. Woodworth and C. C. Kelber. 22 May 51, 99p
P-210

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. Presented at the Annual Summer Meeting of the Institute of Aeronautical Sciences, Los Angeles, California, 27-28 Jun 51.

Descriptors: (*Aircraft engines, Selection), Propulsion, Rocket motors, Ramjet engines, Turbojet engines, Afterburners, Ducted fans, Turboprop engines, Internal combustion engines, Performance (Engineering), Weight, Fuel consumption, Compressors, Aircraft engine ducts.

The generalized approach considers the powerplant in terms of the performance and application requirements of the aircraft. A powerplant choice for a given combination of these requirements represents a compromise between powerplant weight, frontal area, and fuel consumption. Parameters relating to the performance and application requirements of aircraft are used in simplified endurance equations, which encompass a broad range of applications, in combination with powerplant characteristics. By use of electronic calculating equipment, systematic evaluation of each powerplant type and

Descriptors: (*Leadership, Sociometrics), (*Naval personnel, Leadership), (*Group dynamics, Leadership), Motivation, Adjustment (Psychology), Social psychology, Psychometrics, Behavior, Effectiveness, Statistical analysis, Correlation techniques.

The purpose of the present study was to follow-up previous findings concerning the similarities and differences between popular and unpopular leaders in small groups. Attention was not given to the non-leader group in this study. Three hypotheses were established: (1) popular and unpopular leaders are not different from one another on characteristics denoting individual prominence; (2) popular and unpopular leaders are not different from one another on characteristics denoting task-motivation; and (3) popular leaders have a more positive social-emotional orientation than unpopular leaders as evidenced through greater self-control, flexibility, and concern for group relations and harmony.

AD-603 763 Div. 28
OTS Prices: HC $2.00/MF $0.50

Northwestern Univ., Evanston, Ill.
FACTORIAL ANALYSIS OF PRECISION, STEADINESS AND EQUILIBRIUM IN FINE MOTOR SKILLS.
Final rept.
by Robert H. Seashore and Frank J. Dudek.
[1950], 41p
Contract N6ori 158 00, Proj. NR151 132
Unclassified report

Descriptors: (*Psychomotor tests, Psychophysiology), Vision, Hearing, Measurement, Laboratory equipment, Test equipment, Motor reactions, Combinatorial analysis.

To provide a representative sample of fine motor psychomotor skills emphasizing precision, steadiness, and equilibrium, a battery of eleven laboratory instruments was devised, all having automatic scoring on electric counters. These tests provided a total of twenty-six measurements analyzing such factors as the effect of standing or sitting posture; sense modalities or vision, audition or equilibrium; and movements in two or three dimensions. The two studies on this project report correlations from three groups of psychology students factorially analyzed by separate groups with quite consistent identification of seven group factors underlying precision of motor performances. (Author)

AD-603 766 Div. 28, 16
OTS Prices: HC $3.00/MF $0.75

TRACOR, Inc., Austin, Tex.
BINAURAL INTERACTION.
Summary rept. for 1 Apr 63-1 Apr 64,
by Bruce H. Deatherage. 8 Jun 64, 67p
TRACOR-64-199-U
Contract Nonr4193 00
Unclassified report

Descriptors: (*Auditory perception, Psychophysiology), (*Psychoacoustics, Thresholds (Physiology)), Physiology, Neurology, Nerve impulses, Nervous system, Hearing, Auditory signals, Ears, Sound, Stimulation, Measurement, Pitch discrimination, Electronic equipment, Frequency, Potentiometers, Bibliographies, Psychology, Anatomy.

A summary of research done on binaural interaction is presented. The aims of the work are (1) to extend knowledge of the mechanisms of binaural interaction, and (2) to outline the problems a theory of binaural interaction must solve. A selective bibliography emphasizing relevant anatomical, physiological, and psychological factors is included.

AD-603 793 Div. 28
OTS Prices: HC $1.00/MF $0.50

Stanford Univ., Calif.
PERCEPTION OF LEADERSHIP IN SMALL GROUPS; A RANK ORDER INVESTIGATION OF THE EMERGENCE OF THE LEADERSHIP ROLE IN SMALL GROUPS.
Technical rept. no. 9,
by Thomas W. Harrel and Hans E. Lee. Jul 64, 13p
Contract Nonr225 62, Proj. NR171 388
Unclassified report

Descriptors: (*Leadership, Perception (Psychology)), (*Perception (Psychology), Leadership), (*Group dynamics, Psychometrics), Selection, Social psychology, Sociometrics.

To study the process wherby small groups come to identify one of their menbers as a leader and to investigate whether such emergent leadership could be predicted from a knowledge of other variables, 49 groups of either 4 or 5 men were assembled to discuss a human relations case. Within each group, the rank order of the men on 42 psychological test variables, 6 observational and sociometric variables, and 6 peer rating variables was computed. The distribution of these ranks for each variable, for those subjects who received the highest rank in response to the sociometric question, 'Which member of the group would you say stood out most definitely as leader in the discussion?' was contrasted with the distribution on the same variable for those subjects who received the lowest rank to the leadership question. The clearest reason that was found to explain why men were designated as the leader was that they had a higher rate of interaction. Those who acted the most were the most likely to be judged to have been the leader. (Author)

AD-603 944 Div. 28
OTS Prices: HC $1.00/MF $0.50

[Group Effectiveness Research Lab.] Univ. of Illinois, Urbana.
AN ANALYSIS OF THE METHOD OF TRIADS IN RESEARCH ON THE MEASUREMENT OF MEANING.
Technical rept. no. 17,
by Kenneth I. Forster, Harry C. Triandis, and Charles E. Osgood. Jun 64, 25p
Contract Nonr1834 36, Proj. NR177 472
Unclassified report

Descriptors: (*Word association, Social communication), (*Social communication, Word association), (*Language, Group dynamics), Psychometrics, Reaction (Psychology), Behavior, Culture, Stimulation, Correlation techniques, Attitudes, Tests, Social psychology, Sociometrics.

As part of an attempt to develop quantitative measures of meaning that differ from the measures of affective meaning that are already available, the present study focused on the relationships between indices of meaning similarity obtained from the semantic differential, the method of associative overlap and the method of triads. Concepts having similar semantic differential profiles were selected, and meaning similarity indices by the above mentioned three methods were compared. It was found that the associative overlap indices were highly correlated with the judgments of meaning similarity obtained by the method of triads. The affective coding of words was also related to the triadic judgments, but this effect was slight. It is concluded

28. Psychology and Human Engineering

AD-603 528 Div. 28
OTS Prices: HC $3.00/MF $0.50

Washington Univ., St. Louis, Mo.
OPERATOR PERFORMANCE STUDIES: II. LEARNING ANALYSIS FROM THREE-PLANE MOTIONS.
Final rept.,
by Gerald Nadler and Jay Goldman. May 61, 54p
Contract Nonr816 08

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Learning, Psychometrics), (*Performance tests, Time studies), Job analysis, Performance (Human), Operators (Personnel), Motor reactions, Motion, Industrial psychology.

The purpose of the experiment was to find motion performance measurements which can replace (correlate highly with) the usual learning curve ordinate measurement (output units or performance times). The reason for obtaining a motion performance measurement to replace performance times or output units is two-fold: (1) To find a characteristic of human performance which causes differential learning performance times or output units, and (2) To develop a more precise measurement (rating or leveling)of operator performance. A simple task and motion pattern were used to provide the greatest control over the activities, to enable proper interpretation of results, and to permit realistic handling of the tremendous amount of data available from the UNOPAR. Each experiment in this series leads to more complicated motion experiments to provide basic theories upon which learning and operator performance predictions can be based.

AD-603 546 Div. 28, 16, 18
OTS Prices: HC $2.00/MF $0.50

Institute of Environmental Psychophysiology, Univ. of Massachusetts, Amherst.
VISUAL AFTER-IMAGES AS A SOURCE OF INFORMATION.
Technical rept. no. 3,
by Warren H. Teichner and Mahlon Wagner. 11 Jun 64, 47p
Contract N61339 1303
NAVTRADEVCEN 1303 3

Unclassified report

Descriptors: (*Afterimages, Vision), (*Memory, Afterimages), Visual perception, Display systems, Psychophysiology, Data, Decision making, Sources, Military intelligence.

The report is one of 3 evaluations of differently proposed methods for increasing the ability of individuals to report the contents of briefly exposed visual displays. In this case concern was with the ability of observers to extract data from induced retinal after-images as a means of increasing the display exposure time in single glimpse situations. It was found that observers can use after-image data, and that the gain in reporting to be expected will be greatest for those situations where, without after-images, reporting is most difficult, that is, under conditions of high display load or very short exposure time. The benefit demonstrated was associated primarily with the positive after-image; however, the negative after-image was not ruled out as a persistent data source. (Author)

AD-603 554 Div. 28
OTS Prices: HC $1.00/MF $0.50

Washington Univ., St. Louis, Mo.
SOCIAL INFLUENCE, INFORMATION PROCESSING, AND NET CONFORMITY IN DYADS.
Technical rept.,
by Richard H. Willis. Jul 64, 25p
Contract Nonr816 12

Unclassified report

Descriptors: (*Group dynamics, Psychometrics), (*Perception (Psychology), Motivation), Decision making, Job analysis, Personality, Reaction (Psychology), Photographs.

Subjects, variously motivated, ranked ten stimulus photographs according to judged artistic merit. Analysis and subsequent interpretation of the rankings supported the following hypotheses: (1) subjects perceiving partners to be superior to themselves in task competence will exhibit more net conformity to partners' judgments than will subjects perceiving partners to be inferior to themselves in task competence; (2) the effect described in (1) will be more pronounced in a context stressing an information processing orientation than in one placing explicit stress on a social orientation; (3) the effect described in (2) will be more pronounced inthe case of male subjects than it will in the case of female subjects; (4) subjects will exhibit a greater dependence upon partners in the information processing set than in the explicit social set.

AD-603 578 Div. 28, 16
OTS Prices: HC $1.00/MF $0.50

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
BODY SIZE, SELF EVALUATION, AND MILITARY EFFECTIVENESS,
by E. K. Eric Gunderson. Jul 64, 11p
Task MR005 12 2004
NMNRU 64 14

Unclassified report

Descriptors: (*Personality, Naval personnel), (*Performance (Human), Naval personnel), (*Naval personnel, Performance (Human)), (*Psychometrics, Naval personnel), Performance tests, Effectiveness, Adjustment (Psychology), Attitudes, Behavior, Social psychology, Psychophysiology, Correlation techniques, Body weight, Intelligence tests.

In a population on young, healthy Navy men dissatisfaction with height and weight varied directly with deviation from preferred (ideal) height and weight. Dissatisfaction with intellectual level generally varied inversely with intelligence, although within a wide range of GCT scores no relationship was present. Height appeared to have a pervasive effect upon self evaluations generally. Short-Underweight and Short-Overweight groups had the most unfavorable self-images. Neither height nor weight seemed to have an effect upon military performance except at the extremes. Very short and overweight individuals tended to be both unhappy with themselves and ineffective in performance. (Author)

AD-603 580 Div. 28
OTS Prices: HC $1.00/MF $0.50

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
AN EVALUATION OF A POPULAR LEADER,
by Paul D. Nelson. Jun 64, 7p
Task MR005 12 2004
NMNRU 63 9

Unclassified report

order to gain some experience in the organization, administration, and analysis of other of its general type. The type has been selected in an effort to find one that permits testing of a wide variety of mathematical theories pertinent to be study of social organizations. The one trial reported here is used only for convenience, as an example, in this very preliminary discussion of the planned experimental series. (Author)

AD-603 998 Div. 28
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A PREFERENCE EXPERIMENT (SERIES 2, TRIAL 1),
by M. M. Flood. 5 Dec 51, 44p P-258
Unclassified report

Descriptors: (*Group dynamics, Decision making), (*Game theory, Decision making), (*Decision making, Group dynamics), Psychometrics.

An experiment is reported in which a group of seven subjects were required to select one from among eleven objects and to dispose of it among themselves. Their solution is compared with others possible, such as those suggested by game-theoretic considerations, and it is considered that the group failed by a substantial margin to find an optimal selection and disposition. Deficiencies of majority voting, as a decision process, are noted and psychological factors enter into the group process in an important fashion. (Author)

AD-604 002 Div. 28
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A PREFERENCE EXPERIMENT (SERIES 2, TRIALS 2, 3, 4),
by M. M. Flood. 25 Jan 52, 24p P-263
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Game theory, Group dynamics), (*Group dynamics, Decision making), (*Decision making, Group dynamics), Psychometrics.

Trials 2, 3, and 4 of a preference experiment described in AD603 998 are reported. A group of seven subjects was required to select one from among a group of objects and to dispose of it among themselves. The objects were miscellaneous items such as a banjo, flower bowl, etc., donated by the subjects. The subjects were all RAND employees. The trials reported here were concerned with non-zero-sum game theory and closely related mathematical theories relating to group decision processes, as in the first trial. Variations were introduced in these trials by using experienced subjects, and by using chances at objects in place of the objects used in Trial 1. (Author)

AD-604 017 Div. 28
OTS Prices: HC $3.00/MF $0.75

Honeywell, Inc., Minneapolis, Minn.
STUDIES COMPARING EFFECTIVENESS OF THREE-DIMENSIONAL VERSUS TWO-DIMENSIONAL PRESENTATIONS.
Final rept.
by H. E. Guttmann and D. A. Anderson. 6 Nov 62, 69p
MH-MPG-1525-TR1
Contract AF30 602 2379
RADC TDR63 39; PB 165 332 Unclassified report

Descriptors: (*Display systems, Human engineering), (*Stereoscopic display systems, Effectiveness), (*Position finding, Performance tests), Visual perception, Decision making, Performance (Human), Positioning reactions, Targets, Velocity, Errors.

The study compared the efficacy of two types of displays: A real three-dimensional display versus an orthogonal dual projection two-dimensional display. Subjects were required to make judgments of absolute position of targets, relative position of targets, absolute velocity, and relative velocity. In judgments of absolute velocity, performance was slightly superior on the three-dimensional display. In the other areas investigated, performance was superior on the two-dimensional display. (Author)

AD-604 135 Div. 28, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TESTING ORGANIZATION THEORIES,
by M. M. Flood. 1 Nov 52, 22p P-312
Unclassified report

Descriptors: (*Decision making, Mathematical models), (*Mathematical models, Decision making), Group dynamics, Learning, Behavior, Stochastic processes, Game theory, Test methods, Statistical analysis.

A discussion of a few typical theories of decision making in small human groups, and description of a few pilot experiments illustrating the kind of theoretical and experimental problems that are met in testing these theories. (Author)

AD-604 156 Div. 28
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE INFLUENCE OF ENVIROMENTAL NON-STATIONARITY IN A SEQUENTIAL DECISION-MAKING EXPERIMENT,
by Merrill M. Flood. 17 Nov 52, 34p P-345
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Sequential analysis, Decision theory), (*Decision making, Psychometrics), (*Game theory, Decision making), (*Mathematical models, Decision making), Behavior, Probability, Learning, Reaction (Psychology), Stimulation, Stability, Performance tests, Statistical analysis, Stochastic processes, Sampling.

A study was made on a series of pilot experiments, and on their theoretical background, that investigated the effect on human decision-making of a belief that the environment is changing when in reality it is constant. The results suggest that subjects tend to search more among poore alternatives when they believe that the situation is changeable, and in conformity with mathematical models suggested by W. K. Estes and R. R. Bush to describe the two types of decision-making behavior. (Author)

AD-604 157 Div. 28, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON GAME-LEARNING THEORY AND SOME DECISION-MAKING EXPERIMENTS,

that S's judgments of meaning similarity are causally dependent on associative connections between words rather than a knowledge of formal semantic relationship between words, such as synonymy or mutual substitutability. The method of associative overlap appears to provide a promising procedure for the measurement of meaning similarity. (Author)

AD-603 945 Div. 28
OTS Prices: HC $4.00/MF $0.75

Group Effectiveness Research Lab., Univ. of Illinois, Urbana.
PERSON PERCEPTION AMONG AMERICAN AND INDIAN STUDENTS [AND] CREATIVE PROBLEM SOLVING IN CULTURALLY HETEROGENEOUS GROUPS.
Technical rept. nos. 15 and 16,
by Harry C. Triandis, Martin Fishbein, and Eleanor R. Hall. Jun 64, 121p
Contract Nonr1834 36, Proj. NR177 472
Unclassified report

Descriptors: (*Group dynamics, Attitudes), (Perception (Psychology), Group dynamics), (*Character recognition, Factor analysis), Behavior, Stimulation, Culture, Social psychology, Anthropology, Reaction (Psychology), Psychometrics, Sociometrics, Personality, Social communication, Analysis of variance, Correlation techniques, Students.

The generality of the analyses reported by Triandis (1964b), in which the behavioral differential was employed with American students, was checked with a sample of American as well as a sample of Indian students, and with a different set of stimulus persons. The findings appear to be quite stable across samples of Ss. The relationships between the behavioral and semantic differentials were examined in detail. In general, the first factor of the behavioral and semantic differential are highly intercorrelated, but for certain stimulus persons this correlation breaks down. The determinants of similarity and difference in the results obtained from the two instruments are described. Twelve dyads consisting of two Americans, 12 consisting of two Indians, and 22 consisting of one American and one Indian were given a problem that was designed to produce disagreement between an American 'technological expert' and an Indian. The dyads produced both a variety of solutions to the problem and then a single integrative solution. These solutions were rated on their originality, efficiency, acceptability to Indian villagers, and acceptability to Indian students. (Author)

AD-603 946 Div. 28
OTS Prices: HC $4.00/MF $1.00

Group Effectiveness Research Lab., Univ. of Illinois, Urbana.
SOME EFFECTS OF LEADERSHIP TRAINING ON INTERCULTURAL DISCUSSION GROUPS.
Technical rept. no. 18,
by Lynn R. Anderson. Jun 64, 150p
Contract Nonr1834 36, Proj. NR177 472
Unclassified report

Descriptors: (*Leadership, Training), (*Group dynamics, Leadership), (*Personality, Leadership), Culture, Attitudes, Behavior, Performance (Human), Social psychology, Sociometrics, Psychometrics, Stress (Psychology), Performance tests, Reaction (Psychology), Social communication, Correlation techniques.

Eighteen American Ss were given leadership training which was 'redundant' to their personal leadership style as measured by Fiedler's LPC score (esteem for least preferred co-worker). Another 18 Ss were given training which was 'complementary' to their personal leadership style in suggesting an additional set of leadership behaviors. The leaders were then appointed chairmen of groups composed of one other American S and one Indian S. Results indicated that (a) leaders given complementary training had somewhat higher performance ($p < .10$) than leaders given redundant instructions on a creativity task although no differences were found on an intercultural negotiation task; (b) a curvilinear relationship was evident between the correlation of leader LPC and group performance when the 'effective power' of the leader was considered; (c) individual measures of social distance toward the opposite culture were negatively related to group performance; (d) intelligence and creativity scores were complexly dependent upon the task and the culture and role of the individual. (Author)

AD-603 963 Div. 28, 12, 16
OTS Prices: HC $0.75/MF $0.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
THE EFFECTS OF VIBRATION ON DIAL READING PERFORMANCE.
Rept. for May 63-Feb 64,
by Harvey A. Taub. Jul 64, 28p CAL VH-1838-E-1
Contract AF33 657 11729, Proj. 7231, Task 723101
AMRL TDR64 70
Unclassified report

Descriptors: (*Vibration, Visual acuity), (*Acceleration tolerance, Visual acuity), (*Visual acuity, Vibration), (*Helmets, Acceleration tolerance), Tolerances (Physiology), Performance tests, Performance (Human), Space medicine, Launching, Atmosphere entry, Stress (Physiology), Space environmental conditions, Posture, Astronauts, Oscillation, Manned spacecraft, Models (Simulations), Air force personnel, Analysis of variance.

Four experiments were performed to determine the effects of whole-body sinusoidal vibrations in the X, Y and Z axes upon dial reading performance. The subjects were in the semisupine position so that the force of gravity was directed through the X axis of the body. In all four experiments, performance at 6, 11 and 15 cps was compared at various levels of acceleration and with and without the use of a helmet restraint. Further, performance was assessed with an easy and a difficult dial reading task. The results indicated that performance with the easy task was relatively unaffected by the vibration conditions while large and significant losses in performance occurred with the difficult task. Mean errors for the difficult dial reading task increased significantly as acceleration level of vibration increased. The results further indicated that the effects of helmet restraint and frequency upon performance with the difficult reading task varied with the direction of vibration. That is, the use of a protective device to restrict helmet movements: (a) improved performance at all frequencies when vibration was in the X axis; (b) improved performance at 6 cps, but degraded performance at 11 and 15 cps in the Y axis, and (c) had no effect when vibration was in the Z axis. (Author)

AD-603 997 Div. 28
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A PREFERENCE EXPERIMENT,
by M. M. Flood. 13 Nov 51, 45p P-256
Unclassified report

Descriptors: (*Decision making, Group dynamics), (*Group dynamics, Mathematics), Psychometrics.

The experiment reported in this paper was conducted in

30. Research and Research Equipment

AD-603 632 Div. 30, 8
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
ABNORMAL CHARACTERISTICS OF INTERFERENCE FILTERS,
by Allen L. Olsen and Karen E. Plain. Jun 64, 12p
NOTS TP3575; NAVWEPS 8550

Unclassified report

Descriptors: (*Test equipment, Band-pass filters), (*Band-pass filters, Test equipment), (*Spectrophotometers, Calibration), Interference, Narrowband, Manufacturing methods, Wave transmission, Dielectric films, Silicon compounds, Oxides, Germanium, Sensitivity, Performance (engineering), Standards, Test methods.

Three narrow band-pass multilayer dielectric spike filters have been investigated as secondary standards in wavelength calibration of spectrophotometers. The wavelengths of the center of the band pass were sensitive to specimen rotation in the energy beam, and interference patterns, in several cases, were superimposed on the wavelength trace. The wavelengths were also sensitive to the location of the specimen within the sample compartment. In all three filters, specimen rotation produced the greatest shift in wavelength at the focal plane and the least shift at the monochromator end of the cell holder. In the latter case, the spread of values greatly exceeded the ± deviations of the wavelength reproducibility of the instrument and the accuracy of the wavelength standard. The presence of interference fringes in the substrates, microscope cover-glass slips, account for the interference patterns in the spectral trace. It was impossible to check the uniformity of deposition of the dielectrics over the surface area. Inhomogeneities could produce shifts of the wavelength peaks. Homogeneous deposition of dielectrics on a substrate free of interference fringes should produce a spike filter with calibration capabilities comparable to the standard, ± 0.0002 micron. (Author)

AD-603 665 Div. 30, 28
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MAN AND THE MACHINE,
by A. I. Berg. 9 Jul 64, 6p
FTD TT64 404; TT 64 71186

Unclassified report

Unedited rough draft trans. of Nuaka i Zhizn' (USSR) 1962 v. 29 no. 8, p. 76.

Descriptors: (*Cybernetics, Theory), Artificial intelligence, Symposia, USSR.

Proceedings from a conference devoted to philosophical problems in cybernetics are presented.

AD-603 697 Div. 30, 32
OTS Prices: HC $5.00/MF $1.00

Radio Corp. of America, Bethesda, Md.
FACT CORRELATION EXPERIMENTATION,
by N. H. Hardwick, S. N. Jacobson, D. E. Rogers, and G. H. Woolley. May 64, 181p
Contract AF30 602 2979, Proj. 4594, Task 459401
RADC TDR64 190

Unclassified report

Descriptors: (*Language, Processing), (*Information retrieval, Digital computers), (*Programming (computers), Information retrieval), Analysis.

The report covers several facets of an experimental program to develop and test techniques to the realization of fact correlation capability. Primarily, these techniques are linguistically oriented and particularly are concerned with paragraph analysis, the ability to reorganize natural language text in a meaningful way using automatic and semiautomatic methods. Non-linguistic approaches based on vocabulary manipulation were also investigated to a limited extent. The rationale, development, and implementation of techniques are described in some detail. The test vehicle for evaluating these techniques measures their performance in reassembling previously segmented documents. To provide data for the specification of the techniques a sample of scientific documents was prepared for machine processing. A similar sample containing documents matching those in the analysis sample is available for testing the ability of the techniques to reassemble documents. Computer programs representing a document reassembly system to test the linguistic techniques were written in the COMIT programming language for the IBM 7090 computer. Programs for document reassembly to test other techniques were implemented on the RCA 301 computer. Each of these systems is described in detail. (Author)

AD-603 706 Div. 30
OTS Prices: HC $2.00/MF $0.50

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
A MEASUREMENT TECHNIQUE FOR VACUUM-DEPOSITED THIN FILMS,
by Phillip A. Newman and Richard F. Sette. Apr 64, 26p
Task 1G622001A056 01
AELRDL TR2433

Unclassified report

Descriptors: (*Films, Measurement), Interferometers, Thickness, Vapor plating, Vacuum apparatus, Laboratory equipment, Optical equipment, Monochromatic light.

This report presents a laboratory method for the measurement of evaporated thin films in the range 10 to 10,000 Angstroms. Utilizing a multiple beam technique, employing fringes of equal chromatic order and a unique sample holder, films have been measured to a precision of ± 15 A. The simplicity of the components employed is an outstanding feature of the experimental system. (Author)

AD-603 707 Div. 30
OTS Prices: HC $3.00/MF $0.75

System Development Corp., Santa Monica, Calif.
FACTORS THAT AFFECT THE COST OF COMPUTER PROGRAMMING,
by L. Farr and B. Nanus. Jul 64, 68p
SDC-TM-1447/000/02
Contract AF19 628 1648
ESD TDR64 448

Unclassified report

Originally appeared as document TM-1447/000/01.

Descriptors: (*Programming (Computers), Costs), (*Costs, Programming (Computers)), Data processing systems, Programmers, Management engineering.

by Merrill M. Flood. 17 Nov 52, 40p P-346
Unclassified report

Descriptors: (*Game theory, Learning), (*Decision theory, Stochastic processes), (*Learning, Performance tests), Decision making, Performance (Human), Behavior, Mathematical models, Probability, Functions.

The paper reports on games in which a player learns to improve his strategy during the course of a sequence of plays. The fusion model developed by Bush and Mosteller to explain observed behavior of rats in experimental learning situations was used as the basis for both theoretical and experimental investigation of the efficiency of this type of stochastic process in learning to play games. The experiments reported were with human subjects. Their game-learning performance was compared with that of the 'stat-rat', represented by the fusion model with numerical values of the parameters estimated to fit experimental data for rats. The theoretical models accept basic assumptions of von Neumann-Morgenstern game theory and Bush-Mosteller learning theory. The theoretical and experimental results are directly relevant for any situation in which a sequence of decisions is made. (Author)

AD-604 279 Div. 28, 15
OTS Prices: HC $3.00/MF $0.75

Illinois Univ., Urbana.
A MAXIMUM LIKELIHOOD SOLUTION FOR PAIRED COMPARISONS SCALINGS BY THURSTONE'S CASE V.
A MAXIMUM LIKELIHOOD SOLUTION FOR SUCCESSIVE INTERVALS SCALING,
by Ledyard R. Tucker and Peter Schonemann.
Aug 64, 58p Unclassified report

Proj. on Techniques for Investigation of Structure of Individual Differences in Psychological Phenomena.

Descriptors: (*Psychometrics, Statistical analysis), (*Statistical analysis, Psychometrics), Probability, Functions, Reasoning, Statistical tests, Iterative methods, Psychology.

A maximum likelihood solution for Thurstone's Case V for paired comparison scaling by the law of comparative judgments. A computing procedure is described and illustrated with a small, fictitious example. A large sample likelihood ratio test is developed for checking on the appropriateness of the scaling model for the data analyzed. Major advantages of the approach lie in the appropriateness of the likelihood approach for dichotomous observations and in the utilization of all observations in obtaining the estimates of the scale values.
A maximum likelihood solution for the scaling method of successive intervals is presented together with an iterative procedure for obtaining estimates of boundary scale values, stimulus scale values, and stimulus dispersions. The method is applicable to data matrices with missing entries. It has been programmed for Illiac and tried on two illustrative examples. (Author)

29. Quartermaster Equipment and Supplies

No Entries

describes the methodological problems which must be faced in order to collect meaningful data, recommends research which should be undertaken to increase our understanding of this technology, and makes suggestions for improving professional standards in this area. (Author)

AD-603 870 Div. 30, 1, 8, 16, 25, 32
OTS Prices: HC $7.00/MF $1.50

Research Lab., of Electronics, Mass. Inst. of Tech., Cambridge.
QUARTERLY PROGRESS REPORT NO. 74. RADIO PHYSICS, PLASMA DYNAMICS, AND COMMUNICATION SCIENCES AND ENGINEERING .
Rept. for period ending 31 May 64,
by H. J. Zimmermann and G. G. Harvey. 15 Jul 64, 308p
Contract DA36 039AMC03200E; Grant DA SIG36 039 61G14

Unclassified report

Descriptors: (*Reports, Scientific research), (*Scientific research, Reports), (*Electronics, Scientific research), Molecular beams, Microwave spectroscopy, Radio astronomy, Infrared spectroscopy, Geophysics, Masers, X-ray diffraction analysis, Acoustics, Plasma physics, Magnetohydrodynamics, Energy conversion, Communication theory, Speech transmission, Speech recognition, Machine translation, Cardiovascular system, Decoding, Bionics, Biophysics, Neurology.

AD-603 886 Div. 30, 8, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE DEFINITION OF INFORMATION,
by Edgar Reich. 27 Jul 50, 10p P-167

Unclassified report

Descriptors: (*Communication theory, Transformations (Mathematics)), Entropy, Cybernetics, Probability, Statistical analysis, Functions, Integration.

A definition of information is proposed by postulating an invariance under certain types of transformations. For a restricted class of admissible definitions these postulates imply that Shannon's formulation is the only possible one.

AD-603 910 Div. 30, 8
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MODIFICATIONS OF THE RAND REAC,
by Wesley S. Melahn. 26 Feb 51, 9p P-197

Unclassified report

Descriptors: (*Analog computers, Modification kits), (*Computers, Analog computers), Computer logic, Electronic equipment, Styrene plastics, Digital systems, Design, Operation.

The major items of the modification program were the installation of a removable plugboard of the type used on the International Business Machines punched card tabulators, and a digital readout device.

AD-603 912 Div. 30, 8
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE GAME OF 'GOSSIP' ANALYZED BY THE THEORY OF INFORMATION,
by Edgar Reich. 15 Mar 51, 10p P-201

Unclassified report

Descriptors: (*Communication theory, Speech), Electrical networks, Probability, Propagation, Differential equations, Entropy, Noise, Cybernetics, Analog systems.

The paper deals with an analysis of a distributed model of the game of gossip, in which a message is passed through a line of individuals, and the final (in general, garbled) result is compared with the original ungarbled message. The deterioration of information (defined in the sense of Shannon and Wiener) along the line is calculated, and exact as well as asymptotic formulas suggest approximate linear electric network analogues. (Author)

AD-603 955 Div. 30, 16
OTS Prices: HC $3.00/MF $0.50

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A MODEL OF THE INTRA-AURAL REFLEX,
Master's thesis,
by Stephen Barclay Place. Jun 64, 54p
AFIT GGC/EE/64 15

Unclassified report

Descriptors: (*Ear, Bionics), (*Bionics, Ear), (*Reflexes, Bionics), Analog systems, Nonlinear systems, Circuits, Feedback, Models (Simulations), Stimulation.

The intra-aural reflex is a protective mechanism of the middle ear. It behaves in much the same manner as a feedback control system, and can be measured indirectly by measuring the excursions of one eardrum resulting from high intensity sounds impinging upon only the opposite eardrum. In this study, the response of the intra-aural reflex to audio frequency sounds with defined amplitude envelopes was measured and recorded. Based upon these data, as well as upon a block diagram consideration of the linear and non-linear physiological aspects of the intra-aural reflex, an analog computer circuit was developed to model the reflex. The model was subjected to the same stimulus shapes and the response was recorded. Comparison of the response of the reflex and the response of the model revealed a high degree of correlation, and validated the choice of building blocks used for the simulation. (Author)

AD-603 972 Div. 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
JOSS: A DESIGNER'S VIEW OF AN EXPERIMENTAL ON-LINE COMPUTING SYSTEM,
by J. C. Shaw. Aug 64, 36p P-2922

Unclassified report

This paper was prepared for presentation at the 1964 Fall Joint Computer Conference, sponsored by the American Federation of Information Processing Societies, San Francisco, 27-29 Oct 64.

Descriptors: (*Special purpose computers, Data processing systems), (*Data processing systems, Input-output devices), Typewriters, Communication systems, Computer storage devices, Programming languages.

JOSS (JOHNNIAC Open-Shop System) is an experimental on-line, time-shared computing service. It is in daily use by staff members of The RAND Corporation for the solution of small numerical problems. The users compose stored programs and interact with JOSS through remote typewriter consoles by using a

Although accurate estimation of computer programming costs is an important prerequisite for effective programming management, such estimates have historically been very unreliable. Some of the underlying causes of this problem are discussed, and about fifty factors that appear to contribute to the cost of computer programs are identified. Data concerning the effects of a few of these factors upon cost are presented by way of illustration. Recommendations are made for more detailed cost collection, cost analysis, and experimentation. (Author)

AD-603 732 Div. 30, 8, 26
OTS Prices: HC $4.00/MF $0.75

Northwestern Univ., Evanston, Ill.
RESEARCH AND DEVELOPMENT IN THE CHICAGO AREA ELECTRONICS INDUSTRY.
Study rept.,
by Albert H. Rubenstein and Dawson E. Brewer.
Feb 62, 119p
Unclassified report

Sponsored by the Professional Group on Engineering Management of the Institute of Radio Engineers and the National Electronics Conference.

Descriptors: (*Electronics, Industries), (*Research program administration, Electronics), Management engineering, Personnel management, Professional personnel, Economics, Commerce, Electronics laboratories, Illinois.

The study was an attempt to learn more about the relationships between research and development and company growth in the electronic industry with particular reference to the Chicago area.

AD-603 755 Div. 30
OTS Prices: HC $2.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
NONDESTRUCTIVE READOUT SCHEME FOR THIN FILM MEMORIES.
Technical rept.
by M. S. Maltz. 21 May 64, 35p LL-TR-355
Contract AF19 628 500
ESD TDR64 333
Unclassified report

Descriptors: (*Thin films (Storage devices), Display systems), Computer storage devices, Magnetic recording systems, Electromagnetic fields, Communication theory.

If a magnetic bit in a thin film memory array is driven in the hard direction, the changing flux produces eddy currents in the surrounding conducting surfaces. It has been pointed out by Pohm and others that the eddy field produced by these currents always tends to restore the bit magnetization to its original direction. If this eddy field were strong enough at the end of the word drive pulse, the effect could be made the basis of a scheme for nondestructive readout (NDRO). Some experiments were performed on structures where the eddy field was strong enough to restore the bit. The thin film plane used contained 50 x 50-mil x 500-A-thick Permalloy films with uniaxial anisotropy. The word line was completely wrapped around the plane. Word-line-to-word-line spacings of 11.25 and 7.25 mils, and word-line widths of 50, 75, and 150 mils were used. The eddy field was measured at 50 and 100 nsec after the switching operation and, assuming an exponential eddy field decay, a time constant was calculated. Two theoretical approximations were considered. In both, the eddy currents were assumed to flow only in the word lines. In one, the thickness of the lines was assumed negligible. In the other approximation, the thickness of the striplines was considered, but was assumed to be of infinite width. The finite width, thin stripline approximation seems to be in better agreement with the measured values of the time constant which varies between 76 and 200 nsec. (Author)

AD-603 768 Div. 30
OTS Prices: HC $4.00/MF $0.75

Ordnance Research Lab., Pennsylvania State Univ., University Park.
AN ANALYSIS OF FORCE MEASUREMENT,
by G. B. Gurney. 18 Apr 63, 123p
Contracts NOw63 0209c, NOrd 16597
Unclassified report

Descriptors: (*Balances, Water tunnels), (*Force (Mechanics), Measurement), Strain (Mechanics), Strain gages, Transducers, Deflection, Moments, Analysis.

An analysis was made of the Garfield Thomas Water Tunnel's four-component balance to determine why it exhibited some characteristics that were not anticipated when it was designed. The analysis involved the calculation of the effect of cross-wise forces on tension members which are the measuring elements in the balance. These cross-wise forces cause deflections in the measuring element and are called interactions. The analysis of the force cube (cube-shaped balance elements) involved the calculation of the deflections resulting from a force field which is completely described by three forces and three moments. The effect of these deflections on the tension member in the force cube constitutes the evaluation of interactions. The results showed the modified force cube to be significantly better from an interaction standpoint.

AD-603 860 Div. 30, 16, 28
OTS Prices: HC $3.00/MF $0.50

Institute for Defense Analyses, Washington, D. C.
AN ASSESSMENT OF LIE DETECTION CAPABILITY (DECLASSIFIED VERSION),
by Jesse Orlansky. Jul 64, 53p IDA/HQ-64-2770, IDA-TR-62-16
Contract SD50, Task 8
Unclassified report

Originally published as a SECRET NOFORN document by IDA/RESD on 31 Jul 62, as TR 62-16. Portions have been deleted and the remainder of the report has been declassified.

Descriptors: (*Galvanic skin response, Test equipment), (*Psychophysiology, Galvanic skin response), (*Criminology, Galvanic skin response), Autonomic nervous system, Reaction (Psychology), Stress (Psychology), Adaptation (Physiology), Anxiety, Conditioned reflex, Emotions, Personality, Blood pressure, Cardiography, Resperation, Stimulation, Drugs, Arms control, Medical examination, Reliability.

The effectiveness of the polygraph method of lie detection is evaluated. In this technique, the physiological responses of a person being interrogated are observed to provide a basis for inferring whether or not an attempt has been made to deceive the interrogator. The major finding is that, although the method of lie detection has been used extensively and is regarded favorably by its practitioners, the degree of its validity is still not known. This situation is the result of a failure to collect objective data necessary to assess the effectiveness of this method of interrogation. The report

AD-604 204 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE HISTORY AND DEVELOPMENT OF THE ELECTRONIC COMPUTER PROJECT AT THE INSTITUTE FOR ADVANCED STUDY,
by Willis H. Ware. 10 Mar 53, 23p P-377
Unclassified report

A talk presented before the Professional Group on Electronic Computers of the Institute for Radio Engineers, San Francisco, 28 Jan 53.

Descriptors: (*Computers, History).

AD-604 209 Div. 30, 8, 14
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONDUCTIVE PLASTICS IN ANALOG COMPUTING,
by C. J. Nisson. 24 Mar 53, 14p P-384
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Analog computers, Materials), (*Potentiometers, Plastics), (*Plastics, Conductivity), Computers, Reliability (Electronics), Electrical properties, Conductivity.

The paper discusses the use of conductive plastics in potentiometers and generally in fields demanding reliable linear resistive elements.

AD-604 224 Div. 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE EIP. AN EXTERNAL AND INTERNAL PROGRAM SETUP FOR IBM'S MODEL II CPC,
by H. T. McGrath, Jr., W. Orchard-Hays, and J. C. Shaw. 31 Jul 53, 30p P-416
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Programming languages, Punched cards), (*Punched cards, Programming (Computers)), Computers, Data storage systems, Computer logic.

The EIP setup converts IBM's Model II Card Programmed Calculator into an external and internal program, general purpose, floating decimal calculator capable of performing the basic arithmetic operations and many of the elementary functions. A command is a ten digit number which specifies the function code and four addresses, one which is the source of the next command. Four card fields are external storages and may be addressed in the same manner as internal storages. Additional features include: consecutive addresses, 10(1)89, for five 941 Auxiliary Storage Units; automatic quick access storages for the results of the two previous commands; three logical channels for the transfer of numbers from the 941's; and a three way branch command. (Author)

AD-604 225 Div. 30
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
THE EIP. AN EXTERNAL AND INTERNAL PROGRAM SETUP FOR IBM'S MODEL II CPC,
by H. T. McGrath, Jr., W. Orchard-Hays, and J. C. Shaw. 18 Jan 64, 76p P-416 supp.
Unclassified report

Descriptors: (*Programming languages, Punched cards), (*Punched cards, Programming (Computers)), Computers, Data storage systems, Wiring diagrams, Instruction manuals.

Supplimentary data for AD-604 224 consisting of instructions and diagrams for 605 plugboard wiring and 418 internal changes.

AD-604 226 Div. 30, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MATRIX INVERSION ON AN AUTOMATIC CALCULATOR BY ROW AND COLUMN PARTITIONING,
by Harvey M. Wagner. 14 Jul 53, rev. 10 Aug 53, 42p P-417
Unclassified report

Descriptors: (*Programming (Computers), Operation), (*Matrix algebra, Computers), Data storage systems, Automatic, Punched cards.

A method for inverting matrices by row and column partitioning is explained and the necessary programming for the C.P.C. is given. C.P.C. operating time for the procedure is given. A discussion of programming modifications for a high speed electronic computer is also included. (Author)

AD-604 237 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMPUTERS UNLIMITED: DIGITAL MACHNIES IN TOMORROW'S BUSINESS WORLD,
by Willis H. Hare. 21 Sep 53, 21p P-434
Unclassified report

Presented before the Purchasing Agents Association of Los Angeles, 10 Sep 53.

Descriptors: (*Digital computers, Engineering), Data processing systems, Control systems, Banking, Economics, Aeronautics, Mathematics.

Scientific computing, data handling and control--these applications of digital computers are discussed.

AD-604 258 Div. 30, 15
OTS Prices: HC $2.00/MF $0.50

Wisconsin Univ., Madison.
SEQUENTIAL DESIGN OF EXPERIMENTS FOR NON-LINEAR MODELS.
Technical rept. no. 21,
by G. E. P. Box and William G. Hunter. Oct 63, 36p
Contract Nonr1202 17, Proj. NR042 222
Unclassified report

Descriptors: (*Sequential analysis, Mathematical models), (*Mathematical models, Sequential analysis), Engineering, Nonlinear systems, Models (Simulations), Experimental data, Statistical processes.

To engineers, basic mechanism studies are of interest principally because a deeper understanding makes it possible to cope with engineering design problems in a

single, high-level language. The system is described with emphasis on those features which have led users to accept it as a convenient new tool. JOSS provides use of familiar typewriters, exact input/output, decimal arithmetic, high-level algebraic language with English punctuation rules, easy modification and repair of programs, and report-quality formatted output. (Author)

AD-604 064 Div. 30, 12
OTS Prices: HC $2.00/MF $0.50

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
AUTOMATIC RECOVERY FROM TRANSIENT MALFUNCTIONS IN SPACE COMPUTERS.
Final rept., for Jul 63-Jul 64.
Aug 64, 42p
Contract AF04 695 319, Proj. 3176, Task 317601
AL TDR64 142
Unclassified report

Descriptors: (*Digital computers, Spaceborne), (*Aerospace craft, Digital computers), Transients, Malfunctions, Feasibility studies, Computer logic, Programming (Computers), Reliability (Electronics), Automatic, Recovery, Control systems.

An investigation into the feasibility of improving the reliability of spaceborne computers by automatic recovery from transient malfunctions which may occur within the computer was performed. The principal conclusion was that management of the transient malfunctions that may occur within a digital computer by self-contained means is both feasible and practical. Techniques for the detection of malfunctions and for automatic recovery are presented. (Author)

AD-604 137 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
EVEN IN MEMORYLESS ROBOTS THERE IS NO SMALL NUMBER OF CENTRAL CELLS SUFFICIENT FOR ALL INPUT-OUTPUT SPECIFICATIONS,
by J. T. Culbertson. 12 Aug 52, 11p P-316
Unclassified report

Descriptors: (*Input-output devices, Specifications), (*Bionics, Input-output devices), Nerve cells, End organs, Mathematical models, Design.

It is shown that in a memoryless robot some specifications require approximately 2 to the n-th cells. (The proof depends on the realistically unavoidable assumption that there is some maximum number of endbulbs that can contact any one cell.) It is also shown that no significant economies can be achieved by assigning more complex properties to the synapse. (Author)

AD-604 162 Div. 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A SURVEY OF AUTOMATIC COMPUTERS ANALOG AND DIGITAL,
by W. F. Gunning. 23 Dec 52, 47p P-356
Unclassified report

Descriptors: (*Digital computers, Instrumentation), (*Analog computers, Instrumentation), (*Control sequences, Computers), Digital differential analyzers, Classification, Models (Simulations), Costs, Integral equations, Differential equations, Input-output devices, Potentiometers, Computer storage devices, Programming (Computers), Punched cards, Theory, Design.

The theory, design principles and fields of usefulness of the various forms of automatic controllers commonly used in the process industry, are discussed. Some of the computer techniques in the field of instrumentation and control engineering are described.

AD-604 166 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RAND'S DIGITAL COMPUTER EFFORT,
by William F. Gunning. 23 Feb 53, 8p P-363
Unclassified report

Descriptors: (*Digital computers, Operation), (*Air force research, Digital computers), Analog-to-digital converters, Input-output devices, Electronic equipment, Design, Cooling, Computer storage devices, Punched cards.

A report of research done on digital computers is presented. Deviations of engineering importance in the development of the computers are discussed.

AD-604 194 Div. 30, 12, 19, 25
OTS Prices: HC $2.00/MF $0.50

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
THE OPTISYN,
by Harold Seward. Jan 58, 42p E-677
Contracts NOrd17366, AF04 645 9, Projs. 53 138, 52 126
Unclassified report

Descriptors: (*Transducers, Photoelectric effect), (*Sermomechanisms, Transducers), Disks, Glass, Transistors, Rotation, Shafts, Voltage, Phase control devices, Alternating current, Direct current, Analog systems, Digital systems, Power amplifiers, Photosensitivity, Circuits Loading (Mechanics), Instrumentation, Light transmission, Inertial guidance.

The Optisyn is a compact and accurate shaft position transducer. A very simple optical and electronic system is used. The Optisyn is an extremely versatile device and may be operated with a.c or d.c. and in an analog and/or digital manner. (Author)

AD-604 202 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PERMANENT SET-UPS FOR IBM CALCULATORS,
by William Orchard-Hays. 17 Feb 53, 20p P-374
Unclassified report

Descriptors: (*Data processing systems, Mathematics), (*Compilers, Test methods), Functions, Integral equations, Series, Programming (Computers), Operations research.

The purpose of the paper is to discuss the efficiency of different methods of computation wherein the elementary functions and others must be evaluated on the IBM Electronic Calculating Punch, models 604 and 605, and the IBM Card-Programmed Electronic Calculator, models I and II.

32. Miscellaneous Arts and Sciences

AD-603 618 Div. 32, 33, 30
OTS Prices: HC $4.00/MF $0.75

RAND Corp., Santa Monica, Calif.
A MODEL OF RESIDENTIAL LAND VALUES,
by E. F. Brigham. Aug 64, 110p RM4043-RC
Unclassified report

Descriptors: (*Transportation, Urban areas), (*Urban planning, Housing), (*Housing, Economics), Mathematical models, Equations, Transportation, Terrain, Climatology, Sociology, Determination, Programming (Computers), Statistical functions.

This Memorandum presents the findings of a pilot study that deals with the determinants of residential land values in an urban area. As part of the RAND Urban Transportation effort, one primary purpose of this study was to develop a land-value submodel for incorporation in a model designed to simulate the effects of changes in the transportation system of an urban community. The model relates land values to several different factors, particularly to a site's amenities and accessibility to various forms of economic activity. Since residential land values were of main concern, the study concentrates on a sample of single-family properties. As a supplement, and as a basis of comparison, included is a sample of all land-use properties for urban areas. There were important differences between the two samples, and, as might be expected, much more regular patterns occur in the homogeneous single-family grouping. The findings revealed a sufficiently high degree of stability to confirm the basic nature of the relationships, but random variations made the models too unstable to use for accurate predictions of individual parcel land values.

AD-603 674 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CHINA'S RELATIONS WITH ASIAN NEIGHBORS,
by David P. Mozingo. Jul 64, 18p P-2947
Unclassified report

Descriptors: (*China, Foreign policy), (*Political science, China), Asia, Communism, History.

China's foreign policy during the twentieth century and its relationship to her position among her Asian neighbors.

AD-603 806 Div. 32, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE POSSIBILITY OF A UNIVERSAL SOCIAL WELFARE FUNCTION,
by Kenneth J. Arrow. 26 Sep 48, 20p P-41
Unclassified report

Descriptors: (*Decision theory, Social sciences), (*Economics, Decision making), Game theory, Set theory, Political science, Functions.

Decision theory is applied to the problem of ordering preference behavior; i.e., social decisions.

AD-603 810 Div. 32, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE DETERMINATION OF MANY-COMMODITY PREFERENCE SCALES BY TWO-COMMODITY COMPARISONS,
by K. J. Arrow and J. W. T. Youngs. 3 Aug 48, 23p P-49
Unclassified report

Descriptors: (*Decision theory, Commerce), (*Economics, Decision making), Theorems, Correlation techniques, Scale.

It is the purpose of the paper to show that, under the assumptions usually made in economic literature, the determination of a preference scale relating to many commodities can always be accomplished by means of comparisons involving the variation of only two commodities at a time.

AD-603 833 Div. 32, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE FUTURE OF MATHEMATICAL STATISTICS AND QUALITY CONTROL,
by George W. Brown. 18 Aug 49, 8p P-96
Unclassified report

Descriptors: (*Quality control, Statistical analysis), (*Statistical analysis, Quality control), Production, Economics.

The paper discusses a few specific areas of activity in mathematical statistics, illustrating the type of applications presently possible and sketching some of the implications for the future.

AD-603 839 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PRODUCTIVITY AND WELFARE IN SOVIET AGRICULTURE,
by Joseph A. Kershaw. 4 Nov 49, 13p P-109
Unclassified report

Descriptors: (*Agriculture, Economics), USSR, Labor, Industrial production, Political science.

An examination is made of two theses included in Naum Jasny's volume on Soviet agriculture. The theses are: (1) labor productivity on the farm, in the period 1928 to 1938, increased but slightly on a man-year basis and probably not at all on a man-hour basis; and (2) the welfare of both farm and urban dwellers is no higher at the end than at the beginning of the same period. These developments are used as part of the proof that the socialization of agriculture has not been successful. The ten or eleven years following the beginning of the first Five Year Plan are concentrated upon since it was in these years that the basic economic policies were formulated and carried through.

AD-603 842 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INTER-REGIONAL COMMODITY EQUILIBRIUM: SOLUTION BY ELECTRIC ANALOGUE,
by Stephen Enke. 12 Dec 49, 12p P-117
Unclassified report

Descriptors: (*Commerce, Theory), Analog systems, Costs, Economics, Mathematical analysis.

The economic theory of spatially interdependent markets is analyzed. An analogue system is developed which

more intelligent and useful manner than would be possible if the mechanism were entirely unknown. Such mechanism studies consist essentially of two steps: (i) establishing an adequate form for the theoretical model and then (ii) determining precisely the values of its parameters. In this paper it is supposed that step (i) has been accomplished and the form of the theoretical model is therefore known. The problem which confronts the experimenter now is the evaluation of the physical parameters (e.g., rate constants in chemical kinetics examples). The purpose of this paper is to consider the problem of generation of data, i.e., the statistical design of experiments.

AD-604 290 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE EFFECT OF RELIABILITY OF 'SUPERVISORY' EQUIPMENT ON THE ACCURACY OF A 'SUPERVISED' SYSTEM,
by Alexander W. Boldyreff. rev. 28 May 54, 8p
P-466
Unclassified report

Descriptors: (*Automata, Reliability), (*Control systems, Reliability), Failure (Mechanics), Performance (Engineering), Degradation, Circular error probable, Operations research.

The study deals with a basic system, the performance of which degenerates through random errors increasing with the square root of operating time. The probable circular error of this system can be made independent of the time by the addition to the system of supervisory equipment capable of periodic correction of the errors of the basic system. Assuming the supervisory equipment 'fail safe' and subject to constant hazard type of failure the performance of the supervised system is determined for various values of reliability of the supervisory equipment. It is shown that a great improvement in performance is possible even with unreliable supervision. (Author)

AD-604 316 Div. 30, 8, 23
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
APPLICATIONS OF A CATHODE RAY TUBE READOUT DEVICE FOR THE IBM 701 ELECTRONIC DATA PROCESSING MACHINE,
by Paul Armer. 8 Apr 54, 12p P-509
Unclassified report

Descriptors: (*Cathode ray tubes, Input-output devices), (*Display systems, Computers), (*Data processing systems, Display systems), Digital to analog converters, Radar, Simulation, Training devices, Cameras, Plotters.

A Cathode Ray Tube Readout Device for the 701 is described from the user's viewpoint. Its application to a particular problem is discussed. This problem involves a large amount of output and is unusual in that it is the inverse of the data reduction problem. More general uses are also touched upon. (Author)

31. Ships and Marine Equipment

AD-604 011 Div. 31, 9
OTS Prices: HC $4.00/MF $0.75

Oceanics, Inc., Plainview, N. Y.
USE OF JET-FLAPPED HYDROFOILS AS SHIP ANTI-PITCHING FINS,
by Paul Kaplan and Theodore R. Goodman. Jul 64, 115p Oceanics-64 13
Contract NObs88418, Proj. SF013 02 05, Task 1979
Unclassified report

Descriptors: (*Ship structural components, Stabilization systems), (*Stabilization systems, Hydrofoils), (*Hydrofoils, Jet flaps), Pitch (Motion), Inhibition, Cavitation, Boundary layer, Oscillation, Lift, Thrust, Power supplies, Pumps.

An analysis is presented to determine the feasibility of using jet flap foils as anti-pitching fins for large ships. The effectiveness of ordinary anti-pitching fins is limited by the occurrence of cavitation. It is shown that the jet flap postpones cavitation until the lift reaches two to three times the no jet value. Boundary layer calculations indicate that cavitation and not separation is the limiting condition for operation of the foil. For an oscillating jet angle, it is shown that at the frequencies associated with wave orbital velocities the forces are quasi-steady and so is the condition for the inception of cavitation. Finally some consideration of the power requirements necessary to operate the jet flap are presented, and it is shown that the power expended to obtain a 25% decrease in pitch is a very small fraction of the total propulsive power available on an aircraft carrier of the Forrestal class. (Author)

The favorable opinion of the Korean population toward United Nations intervention in Korea is discussed. The reasons for Korean support of this intervention are considered.

AD-603 911 Div. 32, 23
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TAXATION AND INCENTIVE IN MOBILIZATION,
by Gershon Cooper. 7 Mar 51, 29p P-200
Unclassified report

Descriptors: (*Mobilization, Economics), (*Economics, Mobilization), (*Labor, Motivation), Industrial production, Budgets, Mathematical prediction.

The effects on labor incentive of various possible kinds of change in the income tax structure are examined. It is concluded that an a priori determination is possible in some cases, but not in others. The implications of these results for fiscal policy in mobilization are then examined briefly. It is concluded that, if 'pay as you go' is deemed inadequate, it must be on other than incentive grounds. (Author)

AD-603 914 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE COEFFICIENT OF RESOURCE UTILIZATION,
by Gerard Debreu. Apr 51, 33p P-206
Unclassified report

Descriptors: (*Economics, Commerce), Optimization, Costs, Production, Theory, Mathematical analysis.

A numerical evaluation of the 'dead loss' associated with a nonoptimal situation (in the Pareto sense) of an economic system is sought. Use is made of the intrinsic price systems associated with optimal situations of whose existence a noncalculus proof is given. A coefficient of resource-utilization yielding measures of the efficiency of the economy is introduced. The treatment is based on vector set properties in the commodity space. (Author)

AD-603 925 Div. 32, 15, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A COMPARISON OF TREATMENTS OF A DUOPOLY SITUATION,
by J. P. Mayberry, J. F. Nash, and M. Shubik.
10 Jul 51, 24p P-222
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Game theory, Economics), (*Mathematical models, Economics), Industrial production, Bargaining, Industrial relations, Costs.

The purpose of this paper was to take a simple model of two firms in competition, with explicit cost functions and an explicit demand function, and to examine the behavior of the firms on the basis of each of several theories. It was assumed there is no collusion among the buyers, so that the demand function remains fixed and describes the action of the market. Each theory discussed, except the 'contract curve' of Edgeworth, gives a uniquely determined pair of production rates, and all the others, with the exception of the Von Neumann and Morgenstern solution, determine the profit made by each of the two producers. Graphs are given showing the production rates and profits for the various solutions, and will serve to compare the effect of the different formulations on the behavior of the firms.

AD-604 003 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SOVIET CONCEPT OF ECONOMIC REGIONALIZATION,
by Theodore Shabad. 19 Feb 52, 13p P-269
Unclassified report

Descriptors: (*Economics, USSR), (*Geography, Commerce), Industrial production, Agriculture, Population, Transportation, Distribution (Economics).

Economic regionalization in the USSR is an instrument employed by the Soviet regime in political and economic policies -- political in the sense of maintaining its power through proletarian centers of industrial workers and furthering the security of the country through regional self-sufficiency; economic in the sense of industrializing underdeveloped parts of the country, reducing unnecessary long-distance freight hauls, and creating units for the local, quasi-autonomous planning of economic activities.

AD-604 062 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
EFFICIENT ALLOCATION OF RESOURCES,
by Tjalling C. Koopmans. 7 Dec 49, 21p P-116
Unclassified report

Descriptors: (*Economics, Industrial production), (*Industrial production, Control systems), Management engineering, Costs, Mathematical analysis, Commerce, Distribution (Economics).

AD-604 074 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOVIET AGRICULTURAL PROSPECTS,
by Joseph A. Kershaw. 7 Mar 52, 28p P-278
Unclassified report

Descriptors: (*Agriculture, Economics), USSR, Labor, Production, Industries, Political science.

AD-604 081 Div. 32, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ABSTRACT: PROOFS OF THE LAW OF DIMINISHING RETURNS,
by Paul A. Samuelson. 23 Feb 51, 3p P-292
Unclassified report

Descriptors: (*Economics, Mathematical logic), Labor, Production, Functions, Linear programming.

Production functions are used to derive deductions concerning returns to proportions and returns in general.

AD-604 086 Div. 32, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.

allows one to raise or lower the schedule of supply or demand in any region, or alter the freight cost between any two regions, and quickly read off all the repercussions.

AD-603 843 Div. 32, 18, 23
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE AMERICAN SOLDIER AND THE SOCIOLOGY OF MILITARY ORGANIZATION,
by Hans Speier. Rev. 9 May 50, 39p P-119
Unclassified report

Descriptors: (*Military personnel, United States), (*Military organizations, Sociology), Public opinion, Social psychology, Attitudes, Decision making.

The paper is limited to a discussion of four questions: (1) What place do these volumes occupy in the history of the sociology of war and military organizations (2) What lessons can be learned from 'The American Soldier' about the moral fabric of American society and about the personal commitment of Americans to national causes (3) 'The American Soldier' contains many challenges to peacetime social research. One of these challenges is singled out for brief comment and the leads which the work gives to studies in the field of sociology of knowledge is discussed. (4) Many readers of 'The American Soldier' will have wondered, what is, or what can be, the relationship between policy making and attitude research. A few observations on this question are offered. (Author)

AD-603 845 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RUSSIAN LABOR PRODUCTIVITY STATISTICS,
by Walter Galenson. 17 Jan 50, 33p P-126
Unclassified report

Descriptors: (*Industrial production, USSR), (*Labor, Production), Statistical data, Economics, Industries, Coal.

The paper has a threefold purpose: (a) to examine the concepts employed by Russian statisticians in computing labor productivity; (b) to indicate the trend of labor productivity in Russian industry since the inception of the five year plans; and (c) through study of productivity changes in a particular industry, in this case coal mining, to point up some of the problems involved in the analysis of Russian productivity statistics.

AD-603 856 Div. 32, 18
OTS Prices: HC $3.00/MF $0.75

Naval School, Naval Construction Battalion Center, Port Hueneme, Calif.
COMMUNISM; A SELECTED BIBLIOGRAPHY,
comp. and ed. by T. C. Murphy and E. Francis Mason. Apr 64, 78p
Unclassified report

Descriptors: (*Communism, Bibliographies), (*Bibliographies, Communism), Political science, Economics, Propaganda, Foreign policy, China, Cuba, East Germany, West Germany, Italy, Medicine, Far East, Poland, United States, USSR, Agriculture, Education, Propaganda, Military strategy.

AD-603 888 Div. 32
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
POLITBURO IMAGES OF STALIN,
by Nathan Leites, Raymond Garthoff and Elsa Bernaut. 31 Jul 50, 51p P-171
Unclassified report

Descriptors: (*Political science, USSR), (*Foreign government, USSR), (*Communism, USSR), Leadership, Propaganda, Social communication, Social psychology, Attitudes, Reaction (Psychology), Language, Public opinion.

The report is a study of statements about Stalin made by Politburo members on the occasion of his 70th birthday (December 21, 1949) and on the occasion of the elections to the Supreme Soviet (March 12, 1950).

AD-603 892 Div. 32, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE CHOICE AMONG INVESTMENT ALTERNATIVES IN SOVIET ECONOMIC THEORY,
by Norman Kaplan. Rev. 31 Oct 51, 25p P-177
Unclassified report

Presented at a session of the Econometric Society, Chicago, Ill., 27 Dec 50. Based in part on research made possible by a grant from the Social Science Research Council.

Descriptors: (*Economics, USSR), Industrial production, Money, Theory, Reviews.

AD-603 906 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A BOOK REVIEW OF SCHLESINGER'S 'MARX, HIS TIME AND OURS',
by Norman Kaplan. 13 Dec 50, 4p P-190
Unclassified report

Review of mono. pub. New York, Augustus M. Kelley, 1950, 440p. $4.50.

Descriptors: (*Communism, History), (*Political science, Communism), Economics, Communists, Theory, Labor, Social science, Reviews.

A description of the salient features of Marxism, as interpreted by Schlesinger, is presented in the review.

AD-603 908 Div. 32, 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE LESSER EVIL,
by W. Phillips Davison. rev. 28 Mar 51, 16p, P-194
Unclassified report

Descriptors: (*Limited war, Public opinion), (*Far East, Limited war), (*Public opinion, United Nations), Communism, Government (Foreign), Propaganda, Communists, Attitudes, Warfare, Armed forces (United States), Foreign policy.

Descriptors: (*Economics, Consumption), (*Consumption, Economics), Costs, Budgets, Stability, Industrial production, Graphics.

H. Theil has pointed out that under certain conditions the choice between quality and quantity of a commodity involves a consumer's budget line which is convex to the origin. This convexity leads to instability of the tangency solution if it should happen that the utility isoquant is of lesser curvature than the cost isoquant; when this is the case, the point of tangency will represent the worst rather than the best position along any given isoquant. It appears that quite plausible assumptions may lead to convex cost isoquants for the consumer, firm, or economy in spite of the fact that the marginal rate of substitution behaves rather strangely for such isoquants. The main purposes of this note are to look into the question of how general such isoquants and resulting instabilities may be in the quality-quantity problem, considering not merely the possible mathematical formulations of the cost function but also taking into account economic intuition.

AD-604 220 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
STALIN AS AN INTELLECTUAL,
by Nathan Leites. 18 May 53, 32p P408
Unclassified report

Descriptors: (*Communism, USSR), Political science, Communists, Economics, Theory, History, Government (Foreign), Capitalism, Labor, Production.

Stalin's theoretical writings are examined for the purpose of clarifying his accomplishments as an intellectual, and to demonstrate their relevance to any Bolshevik and Soviet patterns of thought. Soviet writing, encouraged by Stalin, long presented him as a master theoretician, without living peer in any field. The noticeable tendency more recently, by his successors, to reduce reference to this (and other) roles of Stalin does not, nevertheless, seek to deny the earlier theme.

AD-604 227 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SOVIET IMAGE OF THE U. S.,
by Melville J. Ruggles. 9 Jul 53, 13p P-418
Unclassified report

Presented in a panel discussion of 'The United States in World Opinion,' at the Univ. of Virginia, Institute of Public Affairs, 9 Jul 53.

Descriptors: (*Attitudes, USSR), (*Communists, Propaganda), (*Propaganda, USSR), United States government, Cold war, Public opinion, Foreign policy, Communism, Social sciences.

The Russian view of the U. S. is pointed out. Some factors affecting national images generally, and their particular force upon Russians when they turn to look at America are discussed.

AD-604 230 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PURGES IN THE SOVIET UNION AND IN THE SATELLITES,
by Herbert S. Dinersten. 3 Aug 53, 20p P-421
Unclassified report

Descriptors: (*Communism, Eastern Europe), (*Communists, USSR), Political science, Police, Leadership, Military strategy, History, Government (Foreign).

The different kinds of purge employed in the Soviet Union to meet various political necessities are examined. Since the present Soviet leadership, with its parochial education, is intimately familiar only with the history of the Soviet Union since 1917, it quite naturally applies Soviet political methods to its management of the satellite countries. Thus an examination of the Soviet system of rule by purge will afford some understanding of events in the satellite countries and also some basis for prognostication.

AD-604 235 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOCIOLOGICAL ASPECTS OF THE INFORMATION PROCESS,
by Paul Kecskemeti. 8 Sep 53, 35p P-430
Unclassified report

Presented at a seminar sponsored by the Ford Foundation Center for Advanced Study on 'The Sociology of Knowledge, New York City, 8-13 Sep 53.

Descriptors: (*Social communication, Sociology).

The thesis of the paper is that the distinction between evidential and non-evidential grounds for adopting beliefs is crucial to the study of the sociology of knowledge.

AD-604 280 Div. 32
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
REAL WAGES IN THE SOVIET UNION, 1928-52,
by Janet G. Chapman. 17 Oct 53, 59p P-449
Unclassified report

Descriptors: (*Wages, USSR), Economics, Data, Costs.

The paper summarizes some preliminary findings of an investigation directed to the compilation on changes in the cost of living and in real wages in the Soviet Union for the years 1928, 1937, 1948, and 1952.

AD-604 286 Div. 32, 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
GERMAN REARMAMENT AND THE OLD MILITARY ELITE,
by Hans Speier. 16 Nov 53, 28p P-458
Unclassified report

Descriptors: (*West Germany, Armament), (*Armament, West Germany), (*Foreign policy, West Germany), (*Officer personnel, West Germany), Government (Foreign), Political science, Military personnel, Public opinion, Leadership, History, Military strategy, Education, Recruitment.

The American policy toward postwar Germany is examined. Rearmament of West Germany is discussed in terms of its political and military significance. The former German military elite are considered as representatives of Germany's military tradition and as persons potentially competent to discuss the military implications of the European Defense Community.

COMMENTS ON SOLOW 'STRUCTURE OF LINEAR MODELS,'
by I. N. Herstein. 28 Apr 52, 4p P-298
Unclassified report

Rept. on Proj. RAND. This study was carried out as part of a Cowles Commission project for Research in Economics.

Descriptors: (*Mathematical models, Linear systems), (*Economics, Mathematical models), Matrix algebra, Theorems.

In his paper 'On the Structure of Linear Models' Solow makes extensive use of some results about the characteristic roots of indecomposable nonnegative matrices which are due to Frobenius. A recent paper by Helmut Wielandt gives a drastically simplified proof of these results of Frobenius; moreover, in several places the results are sharpened. One of the purposes of writing this note is to bring this paper and its translation into English by Herstein to the attention of economists. Debreu and Herstein have succeeded in simplifying even further the proof of these results. It is pointed out here how these results are applicable in either simplifying, or obviating the need of, several of Solow's proofs. (Author)

AD-604 143 Div. 32
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
DEPRECIATION, REPLACEMENT AND GROWTH,
by Evsey D. Domar. 11 Sep 52, 68p P-325
Unclassified report

Descriptors: (*Economics, Banking), (*Money, Economics), Costs, Budgets, Mathematical analysis, Reduction.

The paper deals with growth of investment and of a capital stock subject to depreciation and periodic replacement.

AD-604 148 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE LOGICAL STRUCTURE OF THE UTILITY CONCEPT,
by H. G. Bohnert. 29 Sep 52, 21p P-331
Unclassified report

Descriptors: (*Language, Economics), Mathematical models, Game theory, Decision making, Theory.

The paper points out that entirely aside from the 'psychological' nature of the concept, utility suffers from various syntactical and semantical infirmities which are quite enough to produce the confusion felt in dealing with it. It is intended as a preliminary 'clearing of the ground' for an analysis of rational individual decision on the basis of a 'pleasure-like' concept. (Author)

AD-604 149 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ARITHMANCY, THEOMANCY AND THE SOVIET ECONOMY,
by Norman M. Kaplan. Rev. 6 Mar 53, 45p P-332
Unclassified report

Descriptors: (*Economics, USSR), Industrial production, Costs, Industries, Transportation.

The article criticizes Naum Jasny's analysis of Soviet economics, which deals primarily with the Soviet price system.

AD-604 150 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ACTIVITY ANALYSIS OF TECHNOLOGICAL STRUCTURES IN PRODUCTION: AN EXAMPLE,
by Stanley Reiter. 15 Oct 52, 13p P-335
Unclassified report

Descriptors: (*Economics, Mathematical models), (*Industrial production, Mathematical models), Industrial plants, Matrix algebra.

The activity analysis model seems particularly adapted to the study of technological structures in production, because particular pieces of technology (activities) are explicitly identified in the model, and specific decision variables (activity levels) are associated with them. While the existing formulation of the model does not permit distinctions between different groupings of the same set of activities, a minor modification which makes the model a sector-wise additive one rather than a completely additive one; yields the desired result. The paper is limited to the formulation of the sector-wise additive model, and the presentation of a simple example illustrating its application.

AD-604 163 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A CLASSICAL TAX-SUBSIDY PROBLEM,
by Gerard Debreu. 15 Dec 52, 16p P-357
Unclassified report

Descriptors: (*Economics, Mathematical models), (*Mathematical models, Economics), Industrial production, Consumption, Functions, Differential equations.

AD-604 165 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ATTITUDES TOWARDS THE USE OF FORCE,
by Bernard Brodie. 17 Dec 52, rev. 12 Dec 53, 22p, P-360
Unclassified report

Descriptors: (*Warfare, Public opinion), (*Political science, Warfare), Attitudes, Limited war, Cold war, Nuclear warfare, Foreign policy, History, Armament, Power, Military government.

The use of force and its function the structure of society are discussed. Theories regarding warfare and armament in terms of political acumen and international relations are presented.

AD-604 218 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE EXCHANGE BETWEEN QUANTITY AND QUALITY,
by Jack Hirshleifer. Rev. 13 Aug 54, rev. 7 Mar 55, rev. 15 Mar 55, 15p P-406
Unclassified report

33. Transportation

AD-604 025 Div. 33, 5, 8, 19
OTS Prices: HC $4.00/MF $1.00

Radio Corp. of America, Burlington, Mass.
RECOMMENDATIONS FOR IMPROVEMENT OF AN/TSQ-47 RELATIVE TO SYSTEM INTEGRATION TESTS. Final rept.,
by James J. Lauginiger, Robert P. Morin, and Emmett H. Reid. Feb 64, 140p
Contract AF19 604 8020, Task 8
ESD TDR64 251

Unclassified report

Descriptors: (*Air traffic control systems, Systems engineering), Communication systems, Performance (Engineering), Radar equipment, Navigational aids, Shelters, Mobile, Telephone equipment, Circuits, Frequency, Portable, Microwave equipment, Lighting equipment, Analysis, Design.

This report lists many recommendations for improvement of the AN/TSQ-47 and associated equipment. The range of recommendations extends from minor improvements to major redesign (in the case of the AN/TVN-1 lighting system). The recommended improvements include those which contribute to improved operational efficiency, greater reliability, savings in cost, savings in weight, and combinations thereof.

AD-604 077 Div. 33, 11
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TRANSPORTATION,
by James H. Blackman. 17 Dec 52, 54p P-288, rev.

Unclassified report

Descriptors: (*Cargo, Transportation), (*Traffic, Volume), Cargo vehicles, Railroad cars, Shipping (Marine), Passenger vehicles, USSR, Economics, Industrial production, History.

The volume of traffic (freight and passenger) in the USSR is second only to the United States, and the 1928-1952 percentage rates of growth are considerably in excess of U.S. tempos. Expressed in relative terms (that is, in ton-kilometers expended per unit of output), the transport requirements of the USSR exceed those of all the principal powers of the world. The size of Soviet transportation is a reflection in part of the scale of productive activity. But it also stems from the physical dimensions of the country (some two and one-half times the area of the United States) and the uneven distribution of population and resources. The substantial rise in the relative volume of traffic which occurred under the Soviet regime is due in part to an increase in the average length of haul, which occurred as a result of the expansion of the economically useable territory. In addition, the widening of market relations meant that an increasing percentage of total output enters the transport system. (Author)

AD-604 079 Div. 33, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A CONTINUOUS MODEL OF TRANSPORTATION,
by Martin Beckmann. 25 Mar 52, 28p P-290

Unclassified report

Descriptors: (*Transportation, Mathematical models), (*Costs, Transportation), Economics, Cargo, Cargo vehicles, Traffic, Commerce, Industrial production, Distribution, Vector analysis, Analysis of variance.

Interlocal commodity flows are considered in terms of vector fields. Efficient transportation then gives rise to a problem in the calculus of variations; the flow functions solving this problem contain price distribution functions as parameters. With net production functions dependent on prices, the model describes the flow and prices in a competitive regional market economy. (Author)

AD-604 246 Div. 33, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE ALLOCATION OF SWITCHING WORK IN A SYSTEM OF CLASSIFICATION YARDS,
by Martin Bechmann, Tjalling C. Koopmans, C. B. McGuire, and C. B. Winsten. 3 Dec 53, 12p P-448

Unclassified report

Presented at the meeting of the Railway Systems and Procedures Association, Chicago, Nov 53.

Descriptors: (*Railroads, Economics), (*Economics, Railroads), Railroad cars, Handling, Cargo, Transportation.

AD-604 294 Div. 32, 28
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
WAR AND PEACE,
by Hans Speier. 29 Dec 53, 16p P-471
Unclassified report

Descriptors: (*History, Warfare), (*Warfare, History), (*Social sciences, Warfare), Arms control, Economics, Weapons, Deterrence, National defense, Population, Foreign policy, Political science, Defense systems, Military organizations, Limited war.

AD-604 311 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
GERMAN GEOPOLITICS REVIVED,
by Ewald W. Schnitzer. 21 Mar 54, 23p P-501
Unclassified report

Descriptors: (*Political science, Germany), (*Government (Foreign), Political science), History, Warfare, Military tactics, Theory, Propaganda, Population.

The history of German geopolitics is discussed in relation to its postwar manifestations.

AD-604 315 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE METAMORPHOSIS OF THE STALIN MYTH,
by Robert C. Tucker. 16 Apr 54, 40p P-507
Unclassified report

Descriptors: (*Communism, USSR), Communists, Leadership, Government (Foreign), Political science, Propaganda, Foreign policy, Newspapers, Social science.

A discussion is presented concerning developments in Russia following the death of Stalin. Official Soviet propaganda made an initial attempt to restore Stalin's memory to favor, depicting him as a devoted follower of Lenin, a lifelong exponent of collective leadership, and a humble servant of the will of the Party. The disproportionately heavy stress upon Stalin as a war leader, however, probably reflected the desire of the Kremlin leadership to reassert the principle of Party-political supremacy over the armed forces in the face of claims apparently emanating from professional military circles for an autonomous status within the Soviet system.

AD-604 326 Div. 32, 23
OTS Prices: HC $4.00/MF $0.75

RAND Corp., Santa Monica, Calif.
POLITICAL VIEWS OF THE GERMAN CIVIL SERVICE,
by John H. Herz. 2 Jun 54, 125p P-528-RC
Unclassified report

Descriptors: (*Government employees, Government (Foreign)), (*Foreign policy, Attitudes), Leadership, Political science, Public opinion, Behavior, Economics, Professional personnel, East Germany, West Germany.

SUBJECT INDEX

ABSORPTION SPECTRUM
LINE SPECTRUM
MICROWAVE-OPTICAL EXPERIMENTS AND PSEUDO-STARK EFFECT IN RUBY,
AD-603 649 DIV. 25

ACCELERATION TOLERANCE
VISUAL ACUITY
EFFECTS OF VIBRATION ON DAL READING PERFORMANCE,
AD-603 963 DIV. 28

ACCELEROMETERS
MINIATURE ELECTRICAL EQUIPMENT
MINIATURIZED SPHERICAL PELLET INTEGRATING ACCELEROMETER
AD-603 747 DIV. 7

ACCLIMATIZATION
HIGH ALTITUDE
EFFECT OF AGE AND ALTITUDE ON WORK TOLERANCE,
AD-603 932 DIV. 16

ACETAL PLASTICS
RADIATION DAMAGE
NUCLEAR RADIATION EFFECTS ON THE MECHANICAL PROPERTIES OF ACETAL RESINS DELRIN AND CELCON,
AD-604 016 DIV. 14

ACOUSTIC EQUIPMENT
SEMICONDUCTOR DEVICES
MICROWAVE ACOUSTIC DELAY LINE AND RELATED ACTIVE DEVICES,
AD-604 250 DIV. 8

ACOUSTICS
CYLINDRICAL BODIES
SOUND RADIATION FROM SUBMERGED CYLINDRICAL SHELLS OF FINITE LENGTH,
AD-603 531 DIV. 25

ACOUSTICS
TRANSDUCERS
INTENSITY MEASUREMENT IN NEAR FIELDS AND REVERBERANT SPACES,
AD-603 713 DIV. 25

ACRYLIC RESINS
EXPLOSION EFFECTS
BEHAVIOR OF PLEXIGLAS UNDER SHOCK LOADING BY A TETRYL DONOR,
AD-603 656 DIV. 22

ADAPTIVE CONTROL SYSTEMS
AEROSPACE CRAFT
COMPARISON OF HIGH-GAIN-LINEAR AND SELF-ADAPTIVE FLIGHT CONTROL SYSTEMS WITH NONLINEARITIES INTRODUCED,
AD-603 953 DIV. 12

ADAPTIVE CONTROL SYSTEMS
DESIGN
APPLICATION OF LIMIT-CYCLE AND PARAMETER-PERTURBATION ADAPTIVE TECHNIQUES TO CONTROL OF THE FLEXIBLE SUPERSONIC TRANSPORT,
AD-604 066 DIV. 1

ADAPTIVE CONTROL SYSTEMS
JET BOMBERS
APPLICATION OF THE LIMIT-CYCLE SELF-ADAPTIVE CONCEPT TO THE B-58 LATERAL DIRECTIONAL STABILITY AUGMENTATION SYSTEM,
AD-604 253 DIV. 1

ADSORPTION
MATERIALS
ADSORPTION-DESORPTION PROPERTIES OF SORBENTS FOR CHEMICAL AGENTS,
AD-604 116 DIV. 3

AERODYNAMIC CHARACTERISTICS
BLUNT BODIES
AERODYNAMIC DRAG ON SPIKED BLUNT BODIES IN LOW-DENSITY HYPERSONIC FLOW,
AD-603 567 DIV. 9

AERODYNAMIC CHARACTERISTICS
CONICAL BODIES
THERMAL STRESSES IN CONICAL SHELLS,
AD-604 130 DIV. 9

AERODYNAMIC CHARACTERISTICS
PARACHUTES
THEORETICAL PARACHUTE INVESTIGATIONS; BEHAVIOR AT SUBSONIC AND SUPERSONIC SPEEDS,
AD-603 723 DIV. 9

AEROSOLS
CHEMICAL WARFARE AGENTS
DISSEMINATION OF SOLID AND LIQUID CW AGENTS,
AD-603 644 DIV. 3

AEROSOLS
FLUID DYNAMIC PROPERTIES
NUMERICAL SOLUTION TO THE FLOW OF A GAS-SOLID SUSPENSION THROUGH A NOZZLE,
AD-604 107 DIV. 9

AEROSOLS
INFRARED RADIATION
EXPERIMENTAL STUDY OF INFRA-RED SCATTERING BY CLOUDS OF PARTICLES,
AD-603 851 DIV. 25

AEROSPACE CRAFT
DIGITAL COMPUTERS
AUTOMATIC RECOVERY FROM TRANSIENT MALFUNCTIONS IN SPACE COMPUTERS,
AD-604 064 DIV. 30

AEROSPACE PLANES
FLIGHT CONTROL SYSTEMS
X-20 FLIGHT CONTROL SYSTEM DEVELOPMENT,
AD-603 704 DIV. 1

AEROSPACE PLANES
LANDING GEAR
X-20 (DYNA-SOAR) LANDING GEAR DEVELOPMENT AND QUALIFICATION PROGRAM,
AD-603 703 DIV. 1

AFTERIMAGES
VISION
VISUAL AFTER-IMAGES AS A SOURCE OF INFORMATION,
AD-603 546 DIV. 28

AGING (MATERIALS)
QUARTZ RESONATORS
QUARTZ CRYSTAL AGING EFFECTS,
AD-604 269 DIV. 8

AGRICULTURE
ECONOMICS
PRODUCTIVITY AND WELFARE IN SOVIET AGRICULTURE,
AD-603 839 DIV. 32
SOVIET AGRICULTURAL PROSPECTS,
AD-604 074 DIV. 32

AIR FORCE RESEARCH
DIGITAL COMPUTERS
RAND'S DIGITAL COMPUTER EFFORT,
AD-604 166 DIV. 30

AIR FORCE RESEARCH
REPORTS
A BRIEF SYNOPSIS OF IN-HOUSE RESEARCH,
AD-604 007 DIV. 25

AIR INTAKE FILTERS
GAS TURBINES
DUST CONCENTRATION MEASUREMENT ON THE U. S. ARMY OVERLAND TRAIN MARK II,
AD-604 027 DIV. 11

AIR TRAFFIC CONTROL SYSTEMS
COMMUNICATION SYSTEMS
SURVEY AND ANALYSIS OF LONG-DISTANCE COMMUNICATION TECHNIQUES,
AD-603 865 DIV. 5

AIR TRAFFIC CONTROL SYSTEMS
RADAR BEACONS
EVALUATION OF GENERAL AVIATION TRANSPONDERS,
AD-603 869 DIV. 19

AIR TRAFFIC CONTROL SYSTEMS
SYSTEMS ENGINEERING
RECOMMENDATIONS FOR IMPROVEMENT OF AN/TSQ-47 RELATIVE TO SYSTEM INTEGRATION TESTS,
AD-604 025 DIV. 33

AIRCRAFT
DESIGN
A METHOD FOR DETERMINING THE EFFECTS OF ELEVATED TEMPERATURE ON STRUCTURAL DESIGN AND WEIGHT,
AD-604 307 DIV. 1

AIRCRAFT
VEHICLE BRAKES
LABORATORY AND FLIGHT EVALUATION OF AIRCRAFT AIRCOOLED WHEEL BRAKES WITH BERYLLIUM HEAT SINK,
AD-603 758 DIV. 1

AIRCRAFT ENGINES
SELECTION
THE GENERALIZED APPROACH TO THE SELECTION OF PROPULSION SYSTEMS FOR AIRCRAFT,
AD-603 917 DIV. 27

AIRCRAFT EQUIPMENT
TRANSPONDERS
EVALUATION OF GENERAL AVIATION TRANSPONDERS,
AD-603 869 DIV. 19

AIRCRAFT FIRES
FIRE EXTINGUISHERS
SIMULATED FLIGHT TEST INVESTIGATION OF THE EFFECTIVENESS OF A LIGHTWEIGHT, AIRCRAFT, FIXED, FIRE-EXTINGUISHING SYSTEM,
AD-603 558 DIV. 1
EVALUATION OF LIGHTWEIGHT FIRE EXTINGUISHING SYSTEM UNDER SIMULATED FLIGHT CONDITIONS,
AD-603 746 DIV. 1

AIRCRAFT LANDINGS
ALL-WEATHER AVIATION
ANALOG COMPUTER STUDY OF SAFE LOW APPROACH DECISION REGIONS AND EFFECTIVENESS OF GLIDE PATH EXTENSION TECHNIQUES,
AD-603 869 DIV. 1

AIRCRAFT TIRES
DESIGN
COMPROMISES ESSENTIAL TO SELECTION OF AN AIRCRAFT TIRE TREAD DESIGN,
AD-603 700 DIV. 1

AIRFOILS
PRESSURE
THE EFFECT OF SURFACE PERTURBATIONS ON THE PRESSURE DISTRIBUTIONS ABOUT BLUNT TWO-DIMENSIONAL BODIES AT HIGH MACH NUMBERS,
AD-604 036 DIV. 9

AIRFRAMES
BUCKLING (MECHANICS)
IMPERFECTIONS, A MAIN CONTRIBUTOR TO SCATTER IN EXPERIMENTAL VALUES OF BUCKLING LOAD,
AD-604 033 DIV. 25

AIRFRAMES
IMPACT SHOCK
STRUCTURAL ANALYSIS OF THREE CRASH IMPACT CONFIGURATIONS IN STEEL TUBE AND FABRIC AIRCRAFT,
AD-604 026 DIV. 1

AIRPLANE PANELS
AERODYNAMIC LOADING
TRANSTABILITY FLUTTER OF SUPERSONIC AIRCRAFT PANELS,
AD-603 835 DIV. 1

ALIPHATIC COMPOUNDS
RADIATION CHEMISTRY
RADIOLYSIS OF PROPANE AT LOW CONVERSION,
AD-603 603 DIV. 4

ALKALI METALS
GAS DISCHARGES
PROPERTIES OF HIGH CURRENT, LOW FREQUENCY ELECTRODELESS DISCHARGES EXCITED IN CESIUM, RUBIDIUM, POTASSIUM, AND MERCURY VAPORS,
AD-603 935 DIV. 25

ALKALINE CELLS
ELECTRIC DISCHARGES
TESTING AND EVALUATION OF PRIMARY ALKALINE CELLS AND BATTERIES,
AD-603 581 DIV. 7

ALPHA DECAY
DECAY SCHEMES
SPONTANEOUS FISSION VERSUS ALPHA-DECAY,
AD-604 133 DIV. 20

ALUMINUM
CRYSTAL LATTICE DEFECTS
RESEARCH ON DISLOCATIONS IN FATIGUE-HARDENED AL, AND FATIGUE CRACK PROPAGATION,
AD-603 322 DIV. 17

ALUMINUM
IMPACT SHOCK
DYNAMIC STRESS-STRAIN RELATION OF METAL AS DETERMINED FROM IMPACT

SOVIET STRATEGIC DEBATE: AN IMPORTANT RECENT ADDENDUM,
AD-604 272 DIV. 18

AUDIO AMPLIFIERS
SEMICONDUCTOR DEVICES
MICROWAVE INTERACTIONS IN SEMICONDUCTORS: DISTRIBUTED SINGLE CRYSTAL STRUCTURES: SOLID STATE ULTRASONIC AMPLIFIERS AND TRANSDUCERS,
AD-603 521 DIV. 8

AUDITORY PERCEPTION
PSYCHOPHYSIOLOGY
BINAURAL INTERACTION,
AD-603 766 DIV. 28

AURORAE
SPECTROSCOPY
STUDIES OF LOCAL MORPHOLOGY, STRUCTURE AND DYNAMICS OF AURORA
AD-603 849 DIV. 2

AUTOMATA
RELIABILITY
EFFECT OF RELIABILITY OF 'SUPERVISORY' EQUIPMENT ON THE ACCURACY OF A 'SUPERVISED' SYSTEM,
AD-604 290 DIV. 30

AUTOMATIC PILOTS
ADAPTIVE CONTROL SYSTEMS
COMPARISON OF HIGH-GAIN-LINEAR AND SELF-ADAPTIVE FLIGHT CONTROL SYSTEMS WITH NONLINEARITIES INTRODUCED,
AD-603 953 DIV. 12
AN AUTOMATIC FLIGHT CONTROL SYSTEM TO SIMULATE SUB-EARTH GRAVITY ENVIRONMENTS IN THE KC-135 AIRCRAFT,
AD-603 932 DIV. 12

AVIATION ACCIDENTS
IMPACT SHOCK
STRUCTURAL ANALYSIS OF THREE CRASH IMPACT CONFIGURATIONS IN STEEL TUBE AND FABRIC AIRCRAFT,
AD-604 026 DIV. 1

AVIATION FUELS
COMBUSTION
EFFECT OF JP-5 PROPERTIES ON HOT GAS CORROSION AND FLAME RADIATION,
AD-603 650 DIV. 10

AVIATION SAFETY
HUMAN ENGINEERING
HUMAN FACTORS ASPECTS OF LIGHT PLANE SAFETY,
AD-603 931 DIV. 1

AXIALLY SYMMETRIC FLOW
NUMERICAL ANALYSIS
METHOD FOR CALCULATION OF SLIPSTREAM CONTRACTION OF A SHROUDED IMPULSE DISC WITH APPLICATION TO OTHER AXISYMMETRIC POTENTIAL FLOW PROBLEMS,
AD-604 127 DIV. 9

BALANCES
WATER TUNNELS
ANALYSIS OF FORCE MEASUREMENT ON A WATER TUNNEL FOUR-COMPONENT BALANCE,
AD-603 768 DIV. 30

BAND-PASS AMPLIFIERS
DESIGN
INTEGRATED BANDPASS AMPLIFIERS BASED ON HIGH-RESISTANCE GALLIUM ARSENIDE TRANSISTORS,
AD-603 753 DIV. 8

BAND-PASS FILTERS
TEST EQUIPMENT
ABNORMAL CHARACTERISTICS OF INTERFERENCE FILTERS,
AD-603 632 DIV. 30

BASE FLOW
REYNOLDS NUMBER
BASE FLOW PROBLEM AT VERY LOW REYNOLDS NUMBER IN THE STOKES APPROXIMATION,
AD-603 669 DIV. 9

BATTERIES + COMPONENTS
ALKALINE CELLS
TESTING AND EVALUATION OF PRIMARY ALKALINE CELLS AND BATTERIES,
AD-603 581 DIV. 7

BEAMS (ELECTROMAGNETIC)
ELECTROMAGNETIC FIELDS
THEORETICAL STUDIES OF THE ELECTROMAGNETIC FIELD IN THE FOCAL REGION OF COHERENT LIGHT BEAMS,
AD-603 530 DIV. 25

BEAMS (ELECTROMAGNETIC)
FIELD THEORY
STATISTICAL DESCRIPTIONS OF FREE BOSON FIELDS,
AD-603 619 DIV. 25

BEAMS (STRUCTURAL)
BUCKLING (MECHANICS)
ULTIMATE STRENGTH OF SINGLE-STORY FRAMES SUBJECTED TO LOADING,
AD-603 676 DIV. 13

BEAMS (STRUCTURAL)
MECHANICAL PROPERTIES
TIME-DEPENDENT STRESS-STRAIN DISTRIBUTIONS,
AD-603 924 DIV. 25

BERYLLIUM
CHEMICAL ANALYSIS
DEVELOPMENT OF ANALYTICAL TECHNIQUES FOR THE DETERMINATION OF MINUTE QUANTITIES OF SELECTED ELEMENTS IN BERYLLIUM,
AD-603 756 DIV. 4

BERYLLIUM
VEHICLE BRAKES
LABORATORY AND FLIGHT EVALUATION OF AIRCRAFT AIRCOOLED WHEEL BRAKES WITH BERYLLIUM HEAT SINK,
AD-603 758 DIV. 1

BESSEL FUNCTIONS
INTEGRAL EQUATIONS
SOLUTIONS OF INTEGRAL EQUATIONS RELATED TO THE BESSEL AND MATHIEU FUNCTIONS,
AD-603 982 DIV. 15

BESSEL FUNCTIONS
NUMERICAL ANALYSIS
ANALYTICAL APPROXIMATIONS OF BESSEL FUNCTIONS,
AD-604 167 DIV. 15
ANALYTICAL APPROXIMATIONS OF BESSEL FUNCTIONS OF IMAGINARY ARGUMENT,
AD-604 203 DIV. 15
ANALYTICAL APPROXIMATIONS OF BESSEL FUNCTIONS OF IMAGINARY ARGUMENT,
AD-604 212 DIV. 15
ANALYTICAL APPROXIMATIONS OF BESSEL FUNCTIONS OF IMAGINARY ARGUMENT,
AD-604 214 DIV. 15
ANALYTICAL APPROXIMATIONS OF BESSEL FUNCTIONS AND MACH NUMBERS,
AD-604 223 DIV. 15

BIBLIOGRAPHIES
ASTRONOMY
BIBLIOGRAPHY OF EXTRATERRESTRIAL RESEARCH,
AD-604 105 DIV. 2

BIBLIOGRAPHIES
COMMUNISM
COMMUNISM: A SELECTED BIBLIOGRAPHY,
AD-603 856 DIV. 32

BIBLIOGRAPHIES
RADIATION DAMAGE
MONTHLY ACCESSION LIST, ABSTRACT NO. 24327 TO 24400, PART II,
AD-603 689 DIV. 20

BICONICAL ANTENNAS
DESIGN
BROADBAND LINEAR ARRAY FOR SPACE SURVEILLANCE SYSTEMS,
AD-603 769 DIV. 6

BINARY ARITHMETIC
NUMBER THEORY
CONCERNING COMPOUND RANDOMIZATION IN THE BINARY SYSTEM,
AD-603 798 DIV. 15

BIOCHEMISTRY
CLOSED ECOLOGICAL SYSTEMS
STUDY OF HYDROGEN-FIXING MICROORGANISMS FOR CLOSED REGENERATING BIOSYSTEMS,
AD-603 595 DIV. 16

BIOLOGICAL CONTAMINATION
JET ENGINE FUELS
A STUDY OF EXISTING BASE FUEL HANDLING PROCEDURES IN RELATION TO MICROBIAL CONTAMINATION,
AD-603 852 DIV. 10

BIOLOGICAL WARFARE
ARMED FORCES RESEARCH
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES,
AD-603 661 DIV. 3

BIOLOGY
COMBINATORIAL ANALYSIS
ON INCREASING TREATMENT CONTRAST PRECISION AND THE ESTIMATION OF STRUCTURAL PARAMETERS IN COVARIANCE ANALYSIS,
AD-603 563 DIV. 15

BIONICS
EAR
MODEL OF THE INTRA-AURAL REFLEX,
AD-603 955 DIV. 30

BIONICS
INPUT-OUTPUT DEVICES
NUMBER OF CENTRAL CELLS TO MEET ALL INPUT-OUTPUT SPECIFICATIONS FOR MEMORYLESS ROBOTS,
AD-604 137 DIV. 30

BLOOD VOLUME
HYPOTENSION
PHYSIOLOGY OF PROLONGED OLIGEMIC HYPOTENSION,
AD-603 648 DIV. 16

BLUNT BODIES
AERODYNAMIC CHARACTERISTICS
AERODYNAMIC DRAG ON SPIKED BLUNT BODIES IN LOW-DENSITY HYPERSONIC FLOW,
AD-603 867 DIV. 9

BLUNT BODIES
PRESSURE
THE EFFECT OF SURFACE PERTURBATIONS ON THE PRESSURE DISTRIBUTIONS ABOUT BLUNT TWO-DIMENSIONAL BODIES AT HIGH MACH NUMBERS,
AD-604 036 DIV. 9

BODIES OF REVOLUTION
HYPERSONIC FLOW
LIFT ON INCLINED BODIES OF REVOLUTION IN HYPERSONIC FLOW,
AD-603 829 DIV. 9

BORON COMPOUNDS
NUCLEAR MAGNETIC RESONANCE
CORRELATION OF CHEMICAL SHIFT AND SPIN COUPLING VALUES IN THE B(11) N.M.R. SPECTRA OF BORON COMPOUNDS,
AD-603 782 DIV. 4

BOSONS
QUANTUM STATISTICS
STATISTICAL DESCRIPTIONS OF FREE BOSON FIELDS,
AD-603 619 DIV. 25

BOUNDARY LAYER
MEASUREMENT
REFERENCE TEMPERATURE METHOD FOR COMPUTING DISPLACEMENT THICKNESS,
AD-603 585 DIV. 9

BOUNDARY VALUE PROBLEMS
CONTINUUM MECHANICS
ON THE DERIVATION OF DISCONTINUITY CONDITIONS IN CONTINUUM MECHANICS,
AD-603 926 DIV. 25

BOUNDARY VALUE PROBLEMS
SHEETS
LINEAR BOUNDARY-VALUE PROBLEMS. III: THE LAMBDA-METHOD FOR POLYGONAL PLATES,
AD-603 934 DIV. 15

BRAKES
AIRCRAFT
LABORATORY AND FLIGHT EVALUATION OF AIRCRAFT AIRCOOLED WHEEL BRAKES WITH BERYLLIUM HEAT SINK,
AD-603 758 DIV. 1

BUCKLING (MECHANICS)
CYLINDRICAL BODIES
BUCKLING CHARACTERISTICS OF CORRUGATED CYLINDERS -EFFECT OF USING A HIGH STRENGTH MATERIAL,
AD-603 626 DIV. 13
BUCKLING OF AXIALLY COMPRESSED SANDWICH,
AD-604 014 DIV. 25

BUCKLING (MECHANICS)
STRUCTURES
DYNAMIC BUCKLING OF IMPERFECTION-SENSITIVE STRUCTURES,
AD-603 691 DIV. 13

BUCKLING (MECHANICS)
TEST METHODS
IMPERFECTIONS, A MAIN CONTRIBUTOR TO SCATTER IN EXPERIMENTAL VALUES OF BUCKLING LOAD,
AD-604 033 DIVI 25

BUOYS
POWER SUPPLIES
100 WATT THERMOELECTRIC POWER SYSTEM FOR BOUY APPLICATIONS,
AD-603 787 DIV. 7

CABLES
ICE
TRANSLATION OF RUSSIAN RESEARCH: GLAZED FROST AND ICE FORMATION ON CABLES WITHIN THE TERRITIRY OF THE USSR,
AD-603 335 DIV. 2

CADMIUM COMPOUNDS
FLUORESCENCE
HOMOGENEITY OF CADMIUM SELENIDE-CADMIUM SULFIDE SOLID SOLUTIONS BY X-RAY FLUORESCENCE,
AD-603 604 DIV. 25

CADMIUM COMPOUNDS
RADIATION CHEMISTRY
RADIATION EFFECTS ON NICKEL-CADMIUM BATTERY ELECTRODES AND ON AQUEOUS KOH ELECTROLYTE,
AD-604 037 DIV. 7

CADMIUM COMPOUNDS
RADIATION DAMAGE
LENGTH CHANGE MEASUREMENTS OF ELECTRON-IRRADIATED CADMIUM SULFIDE,
AD-603 606 DIV. 25

TESTS WITH A HARD BALL,
AD-603 929 DIV. 17

ALUMINUM ALLOYS
ARC WELDS
INVESTIGATION TOWARD OBTAINING SIGNIFICANTLY HIGHER MECHANICAL PROPERTIES OF AS-WELDED JOINTS IN HIGH-STRENGTH, HEAT-TREATABLE ALUMINUM ALLOYS,
AD-603 733 DIV. 26

ALUMINUM ALLOYS
CASTINGS
DEVELOPMENT OF MANUFACTURING CAPABILITY FOR PRODUCING HIGH PERFORMANCE ALUMINUM AND MAGNESIUM ALLOY CASTINGS,
AD-603 760 DIV. 26

ALUMINUM ALLOYS
FAILURE (MECHANICS)
RANDOM FATIGUE FAILURE OF A MULTIPLE LOAD PATH REDUNDANT STRUCTURE, AIRCRAFT STRUCTURAL MATERIALS 7075-T6 AND 2024-T4 ALUMINUM AND SAE 4340 STEEL WERE USED,
AD-604 125 DIV. 17

ALUMINUM ALLOYS
PHYSICAL PROPERTIES
MECHANICAL PROPERTIES AND ELECTRICAL RESISTIVITY OF THE HEXAGONAL AG-AL INTERMETALLIC PHASE,
AD-603 543 DIV. 17

ALUMINUM ALLOYS
WELDING
MECHANICAL PROPERTIES TESTS OF WELDED A-356-T6 ALUMINUM ALLOY,
AD-604 055 DIV. 26

AMINO ACIDS
REACTION KINETICS
NMR STUDIES OF THE PROTOLYSIS KINETICS OF GLYCINE,
AD-603 586 DIV. 4

ANALOG COMPUTERS
INSTRUMENTATION
A SURVEY OF AUTOMATIC COMPUTERS ANALOG AND DIGITAL,
AD-604 162 DIV. 30

ANALOG COMPUTERS
MATERIALS
CONDUCTIVE PLASTICS IN ANALOG COMPUTING,
AD-604 209 DIV. 30

ANALOG COMPUTERS
MODIFICATION KITS
MODIFICATIONS OF THE RAND REAC,
AD-603 910 DIV. 30

ANALOG-DIGITAL COMPUTERS
STEREOSCOPES
OPTIMIZED DIGITAL AUTOMATIC MAP COMPILATION SYSTEM,
AD-603 861 DIV. 2

ANALYSIS OF VARIANCE
COMBINATORIAL ANALYSIS
ON INCREASING TREATMENT CONTRAST PRECISION AND THE ESTIMATION OF STRUCTURAL PARAMETERS IN COVARIANCE ANALYSIS,
AD-603 563 DIV. 15

ANALYSIS OF VARIANCE
FACTOR ANALYSIS
PROCEDURE FOR ESTIMATING EFFECTS OF AUGMENTED ARRANGEMENTS RESULTING FROM PARTIAL DUPLICATION OF DESIGNS,
AD-604 261 DIV. 15

ANALYSIS OF VARIANCE
MATHEMATICAL MODELS
BAYESIAN ANALYSIS OF RANDOM-EFFECT MODELS IN THE ANALYSIS OF VARIANCE; POSTERIOR DISTRIBUTION OF VARIANCE-COMPONENTS,
AD-604 266 DIV. 15

ANALYSIS OF VARIANCE
POPULATION (MATHEMATICS)
BEST CHOICE OF SAMPLE SIZE FOR A T-TEST WHEN THE RATIO OF VARIANCES IS KNOWN,
AD-604 063 DIV. 15

ANALYTIC GEOMETRY
GRAPHICS
INCOMPLETE APPROXIMATOR (IN SIX FITS); CURVE FITTING TECHNIQUES,
AD-604 216 DIV. 15

ANTENNA CONFIGURATIONS
ANTENNAS
INVESTIGATION OF THIN WIRE CIRCULAR LOOP ANTENNAS AND ELECTRONICALLY SCANNED CIRCULAR ARRAYS,
AD-603 966 DIV. 8

ANTENNA CONFIGURATIONS
CYLINDRICAL BODIES
CIRCULAR ANTENNA ARRAYS AROUND CYLINDERS,
AD-603 965 DIV. 8

ANTENNA FEEDS
COMMUNICATION SATELLITES (PASSIVE)
INTEGRATED FEED AND FRONT END STUDY OF THE PSRT,
AD-604 121 DIV. 8

ANTENNA RADIATION PATTERNS
ANTENNAS
PATTERN OF FACTORS OF OPEN-CIRCUITED HORIZONTAL ELECTRIC MONOPOLE ANTENNAS LOCATED ON OR VERY NEAR A FINITELY CONDUCTING MEDIUM,
AD-604 013 DIV. 8

ANTENNAS
ANTENNA RADIATION PATTERNS
PATTERN OF FACTORS OF OPEN-CIRCUITED HORIZONTAL ELECTRIC MONOPOLE ANTENNAS LOCATED ON OR VERY NEAR A FINITELY CONDUCTING MEDIUM,
AD-604 013 DIV. 8

ANTENNAS
DIRECTION FINDING
THEORETICAL STUDY, SHIPBOARD DIRECTION FINDING ANTENNA ARRAY,
AD-603 654 DIV. 8

ANTENNAS
EXPERIMENTAL DATA
RESEARCH ON THE PROPERTIES OF ANTENNAS IN CONDUCTING MEDIA,
AD-603 635 DIV. 8

ANTENNAS
POLARIZATION
A SIMPLIFIED VARIABLE POLARIZATION ANTENNA,
AD-604 254 DIV. 8

ANTENNAS
REFLECTORS
TRANSVERSE FOCAL REGION OF A SPHERICAL REFLECTOR; PART II: GEOMETRIC OPTICS,
AD-603 788 DIV. 8
INVESTIGATION TOWARD OBTAINING SIGNIFICANTLY HIGHER MECHANICAL PROPERTIES OF AS-WELDED JOINTS IN HIGH-STRENGTH, HEAT-TREATABLE ALUMINUM ALLOYS,
AD-603 733 DIV. 26

ARGON
GAS IONIZATION
APPLICATION OF LANGMUIR PROBE TECHNIQUES TO FLOWING IONIZED GASES,
AD-603 668 DIV. 9

ARMAMENT
WEST GERMANY
GERMAN REARMAMENT AND THE OLD MILITARY ELITE,
AD-604 286 DIV. 32

ARMING DEVICES
MANUFACTURING METHODS
MINIATURIZED SPHERICAL PELLET INTEGRATING ACCELEROMETER
AD-603 747 DIV. 7

ARMING DEVICES
SAFETY
PROCEDURE FOR DEVELOPMENTAL DROP-TESTING SAFETY AND ARMING MECHANISMS CONTAINING TIME-INTEGRATION SYSTEMS,
AD-604 102 DIV. 22

ARMY OPERATIONS
WEAPON SYSTEMS
ATOMIC WEAPONS AND GROUND COMBAT; SEARCH FOR ORGANIZATION AND DOCTRINE,
AD-604 306 DIV. 18

ARRESTING GEAR
TAPES
PRODUCT IMPROVEMENT PROGRAM TO PROVIDE EXTRA HIGH STRENGTH PURCHASE TAPES FOR THE BAK-9/7498A AIRCRAFT ARRESTING BARRIER,
AD-603 596 DIV. 1

ATLANTIC OCEAN
TROPIC REGIONS
NARRATIVE OF CHAIN CRUISE NO. 17, PHASE II: ST. GEORGE, BERMUDA, TO FREETOWN, SIERRA LEONE,
AD-604 094 DIV. 2

ATMOSPHERE
CHEMICAL REACTIONS
ATOMIC COLLISION PROCESSES IN ATMOSPHERIC GASES,
AD-603 532 DIV. 4

ATMOSPHERE
MOLECULAR WEIGHT
MOLECULAR WEIGHT AND OTHER PHYSICAL PROPERTIES OF THE ATMOSPHERE BETWEEN 80 AND 250KM,
AD-604 001 DIV. 2

ATMOSPHERE
RECOMBINATION REACTIONS
COMPUTER SOLUTION OF TRANSIENT AND QUASI-EQUILIBRIUM ATMOSPHERIC DEIONIZATION EQUATIONS,
AD-604 069 DIV. 2

ATMOSPHERE
SCATTERING
CORRELATION BETWEEN ATMOSPHERIC BACK-SCATTERING AND METEOROLOGICAL VISUAL RANGE,
AD-604 253 DIV. 2

ATMOSPHERE ENTRY
ABLATION
DECELERATION AND MASS CHANGE OF AN ABLATING BODY DURING HIGH-VELOCITY MOTION IN THE ATMOSPHERE,
AD-604 058 DIV. 25
RE-ENTRY VEHICLE SIMULATION DESIGNED FOR THE STUDY OF GROUND SYSTEM REQUIREMENTS,
AD-603 714 DIV. 12

ATMOSPHERIC MOTION
TURBULENCE
CLEAR-AIR TURBULENCE AND ITS ANALYSIS BY USE OF RAWINSONDE DATA,
AD-603 570 DIV. 2

ATMOSPHERIC MOTION
UPPER ATMOSPHERE
TEMPERATURES AND MOTIONS OF THE UPPER ATMOSPHERE,
AD-603 991 DIV. 2
DISPERSIVE CHARACTERISTICS OF THE IONOSPHERE,
AD-604 122 DIV. 2

ATMOSPHERIC SOUNDING
ROCKETS
A PRELIMINARY EVALUATION OF THE CRICKETSONDE ROCKET SYSTEM,
AD-603 592 DIV. 2

ATMOSPHERIC TEMPERATURE
UPPER ATMOSPHERE
TEMPERATURES AND MOTIONS OF THE UPPER ATMOSPHERE,
AD-603 991 DIV. 2

ATOMIC ENERGY LEVELS
CHLORINE
RESONANCES IN THE S32, 33, 34 (P, GAMMA) CL33, 34, 35 REACTIONS WITH BOMBARDING ENERGIES IN THE ONE MEV TO TWO MEV RANGE,
AD-603 601 DIV. 20

ATOMIC ENERGY LEVELS
ORGANIC COMPOUNDS
PHOTOCATALYZED DECOMPOSITION OF WATER; INTRAMOLECULAR ELECTRON TRANSFER IN ORGANIC COMPOUNDS,
AD-603 728 DIV. 4

ATOMIC STRUCTURE
RELATIVITY THEORY
RESOLUTION OF CONVERGENCE DIFFICULTIES IN THE THOMAS-FERMI ATOM MODEL,
AD-604 310 DIV. 25

ATOMIZATION
ELECTROSTATICS
ELECTRICAL ATOMIZATION OF VOLATILE LIQUIDS (IONICALLY DOPED WATER AND LIQUID NITROGEN),
AD-603 682 DIV. 25

ATTENTION
MEDICAL EQUIPMENT
DEVICES FOR INDICATING ALERTNESS,
AD-604 070 DIV. 16

ATTENUATION
GAMMA RAYS
ATTENUATION OF GAMMA RAYS, I, TRANSMISSION VALUES FOR FINITE SLABS OF LEAD, IRON, AND THE COMPTON SCATTERER,
AD-604 199 DIV. 25
ATTENUATION OF GAMMA RAYS, II, TRANSMISSION VALUES FOR VARIOUS MATERIALS AND GEOMETRIES,
AD-604 200 DIV. 25

ATTITUDE CONTROL SYSTEMS
SATELLITES (ARTIFICIAL)
AN ANALYSIS OF COMPENSATION TECHNIQUES AND SENSOR NONLINEARITIES IN A MASS EXPULSION SINGLE-AXIS SATELLITE ATTITUDE CONTROL SYSTEM,
AD-603 954 DIV. 12

ATTITUDE INDICATORS
SPACECRAFT
OPTIMAL LINEAR ESTIMATION FOR A HORIZON SCANNER USED FOR APPROXIMATING THE PITCH ATTITUDE OF AN ORBITING SPACECRAFT,
AD-604 180 DIV. 6

ATTITUDES
USSR
SOVIET IMAGE OF THE U. S.,
AD-604 227 DIV. 32

IN ELECTROFLUID DYNAMIC ENERGY CONVERSION PROCESSES, AD-603 661 DIV. 25

COLOR PHOTOGRAPHY
RADIOGRAPHY
EVALUATION OF COLOR RADIOGRAPHY FOR INDUSTRIAL USE: THE REEXPOSURE METHOD, AD-603 633 DIV. 24

COMBINATORIAL ANALYSIS
ANALYSIS OF VARIANCE
ON INCREASING TREATMENT CONTRAST PRECISION AND THE ESTIMATION OF STRUCTURAL PARAMETERS IN COVARIANCE ANALYSIS, AD-603 563 DIV. 15

COMBINATORIAL ANALYSIS
FACTOR ANALYSIS
ESTIMATING MISSING VALUES IN UNREPLICATED TWO-LEVEL FACTORIAL AND FRACTIONAL FACTORIAL DESIGNS, AD-604 237 DIV. 15

COMBUSTION
CHEMICAL EQUILIBRIUM
SIMPLIFIED METHOD FOR COMPUTING THE EQUILIBRIUM COMPOSITION OF GASEOUS SYSTEMS, AD-603 795 DIV. 4

COMBUSTION
REVIEWS
REVIEW OF SOVIET-BLOC LITERATURE -NEW COMBUSTION PROCESSES, AD-604 176 DIV. 10

COMBUSTION
SIMULATION
SIMULATION OF COMBUSTION MODELS IN WIND TUNNELS, AD-603 813 DIV. 10

COMETS
ANALYSIS
INTERPLANETARY MEDIUM PHYSICS AND COMET TAILS, AD-603 780 DIV. 2

COMETS
PHYSICAL PROPERTIES
STRUCTURE AND DEVELOPMENT OF COMETARY TAIL, AD-604 048 DIV. 2

COMMAND + CONTROL SYSTEMS
MODELS (SIMULATIONS)
ORGANIZATIONAL MODELS FOR COMMAND POST INFORMATION SYSTEMS, AD-603 969 DIV. 18

COMMAND + CONTROL SYSTEMS
SIMULATION
SIMULATION MODELS FOR AEROSPACE COMMAND AND CONTROL, AD-604 024 DIV. 12

COMMAND + CONTROL SYSTEMS
STRATEGIC AIR COMMAND
TEST REPORT FOR MAINTAINABILITY AND MAN-MACHINE INTERFACE DEMONSTRATION PLAN, AD-603 587 DIV. 18
TEST REPORT FOR CATEGORY I ON-SITE ACCEPTANCE AND INTEGRATION TESTING OF THE DIGITAL DATA TRANSFER SYSTEM SUBSCRIBER A (AN/FYQ-3) WITH THE REMOTE COMMUNICATIONS CENTRAL (AN/FYQ-4) AND THE ELECTRONIC DATA TRANSMISSION COMMUNICATIONS AD-603 850 DIV. 5

COMMERCE
THEORY
INTER-REGIONAL COMMODITY EQUILIBRIUM: SOLUTION BY ELECTRIC ANALOGUE, AD-603 842 DIV. 32

COMMUNICATION SATELLITES (ACTIVE)
AIR TRAFFIC CONTROL SYSTEMS
SURVEY AND ANALYSIS OF LONG-DISTANCE COMMUNICATION TECHNIQUES, AD-603 865 DIV. 5

COMMUNICATION SATELLITES (PASSIVE)
ANTENNA FEEDS
INTEGRATED FEED AND FRONT END STUDY OF THE PSRT, AD-604 121 DIV. 8

COMMUNICATION SYSTEMS
COMMAND + CONTROL SYSTEMS
ORGANIZATIONAL MODELS FOR COMMAND POST INFORMATION SYSTEMS, AD-603 969 DIV. 18

COMMUNICATION SYSTEMS
SIGNAL-TO-NOISE RATIO
STUDY AND INVESTIGATION OF POLARIZATION PROGRAMMING: POLARIZATION SYSTEMS ANALYSIS, AD-603 624 DIV. 5

COMMUNICATION THEORY
MATRIX ALGEBRA
REPRESENTATION AND ANALYSIS OF SIGNALS: PART XVIII: VECTOR AND TENSOR ALGEBRA OF SIGNALS APPLIED TO SATELLITE NAVIGATION, AD-603 775 DIV. 8

COMMUNICATION THEORY
NOISE (RADIO)
PASSAGE OF STATIONARY PROCESSES THROUGH LINEAR AND NONLINEAR DEVICES, AD-604 228 DIV. 8

COMMUNICATION THEORY
PROPAGANDA
METHODOLOGY FOR COMMUNICATIONS RESEARCH, AD-603 923 DIV. 18

COMMUNICATION THEORY
SET THEORY
CONSTRAINT ANALYSIS OF MANY-DIMENSIONAL RELATIONS, AD-604 042 DIV. 15

COMMUNICATION THEORY
SPEECH
THE GAME OF 'GOSSIP' ANALYZED BY THE THEORY OF INFORMATION, AD-603 912 DIV. 30

COMMUNICATION THEORY
TRANSFORMATIONS (MATHEMATICS)
ON THE DEFINITION OF INFORMATION, AD-603 886 DIV. 30

COMMUNISM
BIBLIOGRAPHIES
COMMUNISM: A SELECTED BIBLIOGRAPHY, AD-603 856 DIV. 32

COMMUNISM
EASTERN EUROPE
PURGES IN THE SOVIET UNION AND IN THE SATELLITES, AD-604 230 DIV. 32

COMMUNISM
HISTORY
A BOOK REVIEW OF SCHLESINGER'S 'MARX, HIS TIME AND OURS' AD-603 906 DIV. 32

COMMUNISM
USSR
COMMUNIST REACH FOR EMPIRE, AD-603 671 DIV. 18
POLITBURO IMAGES OF STALIN, AD-603 888 DIV. 32
STALIN AS AN INTELLECTUAL, AD-604 220 DIV. 32
THE METAMORPHOSIS OF THE STALIN MYTH, AD-604 315 DIV. 32

COMMUNISTS
PROPAGANDA
SOVIET IMAGE OF THE U. S. AD-604 227 DIV. 32

COMMUNISTS
USSR
PURGES IN THE SOVIET UNION AND IN THE SATELLITES, AD-604 230 DIV. 32

COMPILERS
TEST METHODS
COMPUTER PROGRAMS FOR HAYSTACK SERVO TESTING, AD-603 794 DIV. 8
PERMANENT SET-UPS FOR IBM CALCULATORS, AD-604 202 DIV. 30

COMPLEX COMPOUNDS
GERMANIUM COMPOUNDS
GERMANIUM MACROCYCLIC COMPLEXES BASED ON PHTHALOCYANINE AND HEMIPORPHYRAZINE AD-604 117 DIV. 4

COMPLEX COMPOUNDS
MOLECULAR STRUCTURE
REFLECTANCE SPECTRA AND THE COORDINATION OF DIVALENT METAL IONS IN 5-TRIFLUOROMETHYLTETRAZOLE COMPLEXES, AD-604 185 DIV. 4

COMPLEX COMPOUNDS
REACTION KINETICS
STUDIES OF RELAXATION EFFECTS IN ELECTROLYTIC SOLUTIONS WITH THE PRESSURE-STEP METHOD, AD-604 113 DIV. 4

COMPOSITE MATERIALS
FIBER METALLURGY
FIBER-REINFORCED METALS AND ALLOYS, AD-604 190 DIV. 17

COMPTON SCATTERING
GAMMA RAYS
SCATTERING AND ABSORPTION OF GAMMA RAYS, AD-603 883 DIV. 20

COMPUTER LOGIC
SEMICONDUCTOR DEVICES
PHYSICAL PHENOMENA FOR LOGICAL FUNCTIONS, AD-604 046 DIV. 25

COMPUTER PERSONNEL
PERSONNEL MANAGEMENT
A NOTE CONCERNING THE ORGANIZATION OF AN IBM 701 INSTALLATION, AD-604 314 DIV. 23

COMPUTERS
ANALOG COMPUTERS
MODIFICATIONS OF THE RAND REAC, AD-603 910 DIV. 30

COMPUTERS
HISTORY
HISTORY AND DEVELOPMENT OF THE ELECTRONIC COMPUTER PROJECT AT THE INSTITUTE FOR ADVANCED STUDY, AD-604 204 DIV. 30

CONDITIONED REFLEX
GALVANIC SKIN RESPONSE
RE-ANALYSIS OF GSR CONDITIONING AD-603 576 DIV. 14

CONICAL BODIES
SUPERSONIC CHARACTERISTICS
SUPERSONIC FLOW AROUND CONES AT LARGE YAW, AD-604 291 DIV. 9

CONICAL BODIES
THERMAL STRESSES
THERMAL STRESSES IN CONICAL SHELLS, AD-604 130 DIV. 9

CONSUMPTION
ECONOMICS
EXCHANGE BETWEEN QUANTITY AND QUALITY, AD-604 218 DIV. 32

CONTAINERS
METAL-FORMING PRESSES
DEVELOPMENT OF IMPROVED LINER FOR EXTRUSION BILLET CONTAINERS, AD-604 172 DIV. 26

CONTINUUM MECHANICS
DEFORMATION
MECHANICS OF MATERIALS WITH STRUCTURE: APPLICATION OF CONTINUUM MECHANICS, AD-603 568 DIV. 25

CONTINUUM MECHANICS
MASS ENERGY RELATION
ON THE DERIVATION OF DISCONTINUITY CONDITIONS IN CONTINUUM MECHANICS, AD-603 936 DIV. 25

CONTINUUM MECHANICS
STRESSES
STATIC-GEOMETRIC ANALOGUE IN THE THEORY OF COUPLE-STRESSES, AD-604 175 DIV. 25

CONTROL SEQUENCES
COMPUTERS
A SURVEY OF AUTOMATIC COMPUTERS ANALOG AND DIGITAL, AD-604 142 DIV. 30

CONTROL SYSTEMS
FEEDBACK
THE SENSITIVITY OF GENERAL MULTIVARIABLE FEEDBACK SYSTEMS, AD-604 096 DIV. 15

CONTROL SYSTEMS
GUIDED MISSILES
ANALYSIS OF AN AIR-TO-AIR, AIR-TO-SURFACE MISSILE, AD-603 975 DIV. 12

CONTROL SYSTEMS
MATHEMATICAL ANALYSIS
EVALUATION OF SELECTED DESCRIBING FUNCTIONS OF CONTROL SYSTEM NONLINEARITIES AD-603 957 DIV. 7

CONTROL SYSTEMS
RELIABILITY
EFFECT OF RELIABILITY OF 'SUPERVISORY' EQUIPMENT ON THE ACCURACY OF A 'SUPERVISED' SYSTEM, AD-604 290 DIV. 30

CONVECTION
FLUID MECHANICS
KOLMOGOROV'S HYPOTHESES AND EULERIAN TURBULENCE THEORY, AD-603 628 DIV. 9

CONVEX SETS
GAME THEORY
THEOREM OF VILLE, AD-603 827 DIV. 15
A FURTHER GENERALIZATION OF THE KAKUTANI FIXED POINT THEOREM, WITH APPLICATION TO NASH EQUILIBRIUM POINTS, AD-603 907 DIV. 15
SOLUTIONS OF CONVEX GAMES AS FIXED-POINTS, AD-603 996 DIV. 15

CONVEX SETS
GEOMETRY
GEOMETRY OF MOMENT SPACES, AD-603 980 DIV. 15

CADMIUM COMPOUNDS
SULFIDES
ACOUSTIC AMPLIFICATION AND ELECTRON MOBILITY IN LITHIUM AND SODIUM DOPED CADMIUM SULFIDE,
AD-603 411 DIV. 25
MICROWAVE ACOUSTIC DELAY LINE AND RELATED ACTIVE DEVICES,
AD-604 250 DIV. 8

CALCIUM COMPOUNDS
TUNGSTATES
PLASTIC DEFORMATION OF CALCIUM TUNGSTATE SINGLE CRYSTALS,
AD-604 183 DIV. 25

CALCULUS OF VARIATIONS
DYNAMIC PROGRAMMING
VARIATIONAL PROBLEMS WITH STATE VARIABLE INEQUALITY CONSTRAINTS,
AD-603 722 DIV. 15
DYNAMIC PROGRAMMING AND A NEW FORMALISM IN THE CALCULUS OF VARIATIONS,
AD-604 282 DIV. 15
MONOTONE CONVERGENCE IN DYNAMIC PROGRAMMING AND THE CALCULUS OF VARIATIONS,
AD-604 318 DIV. 15

CALCULUS OF VARIATIONS
GAME THEORY
CLASS OF GAMES OVER FUNCTION SPACE AND RELATED VARIATIONAL PROBLEMS,
AD-604 217 DIV. 15

CALCULUS OF VARIATIONS
INTEGRALS
MAXIMIZING AN INTEGRAL WITH A SIDE CONDITION,
AD-604 152 DIV. 15

CAPACITANCE
NUMERICAL METHODS AND PROCEDURES
A RANDOM WALK RELATED TO THE CAPACITANCE OF THE CIRCULAR PLATE CONDENSER,
AD-604 141 DIV. 7

CAPACITATORS
CAPACITANCE
CAPACITANCE OF CIRCULAR CONDENSER,
AD-603 885 DIV. 8

CAPACITORS
CAPACITANCE
A RANDOM WALK RELATED TO THE CAPACITANCE OF THE CIRCULAR PLATE CONDENSER,
AD-604 141 DIV. 7

CAPACITORS
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE FOR RESISTOR-CAPACITOR MICROELEMENTS FOR MICROMODULES,
AD-604 119 DIV. 8

CARBON
ADSORPTION
ADSORPTION-DESORPTION PROPERTIES OF SORBENTS FOR CHEMICAL AGENTS,
AD-604 116 DIV. 3

CARGO
TRANSPORTATION
TRANSPORTATION OF FREIGHT IN THE USSR,
AD-604 077 DIV. 33

CASTING ALLOYS
MECHANICAL PROPERTIES
DEVELOPMENT OF MANUFACTURING CAPABILITY FOR PRODUCING HIGH PERFORMANCE ALUMINUM AND MAGNESIUM ALLOY CASTINGS,
AD-603 760 DIV. 26

CASTINGS
SPACECRAFT
DEVELOPMENT OF MANUFACTURING CAPABILITY FOR PRODUCING HIGH PERFORMANCE ALUMINUM AND MAGNESIUM ALLOY CASTINGS,
AD-603 760 DIV. 26

CATALYSIS
REACTION KINETICS
SURFACE RECOMBINATION OF OH AND H2 IN THE PRESENCE OF DISTRIBUTED ATOM SOURCES,
AD-604 108 DIV. 4

CATALYSTS
FUEL CELLS
STUDY OF HYDROGEN-OXYGEN FUEL CELL ELECTRODES,
AD-603 430 DIV. 7

CATALYSTS
SELECTION
CATALYST SELECTION! AN APPLICATION OF GROUP SCREENING,
AD-604 263 DIV. 4

CATHODE RAY TUBES
INPUT-OUTPUT DEVICES
APPLICATIONS OF A CATHODE RAY TUBE READOUT DEVICE FOR THE IBM 701 ELECTRONIC DATA PROCESSING MACHINE,
AD-604 316 DIV. 20

CATHODES (ELECTRON TUBES)
FIELD EMISSION
TABLES OF NON-RELATIVISTIC ELECTRON TRAJECTORIES FOR FIELD EMISSION CATHODES,
AD-604 256 DIV. 8

CATHODES (ELECTRON TUBES)
MICROWAVE EQUIPMENT
THIN-FILM COLD CATHODES FOR MICROWAVE TUBES,
AD-603 762 DIV. 8

CELESTIAL GUIDANCE
GUIDED MISSILES (SURFACE-TO-SURFACE)
LUNAR PARALLAX METHOD OF ASTRO NAVIGATION,
AD-603 895 DIV. 19

CELESTIAL NAVIGATION
ASTROPHYSICS
LUNAR PARALLAX METHOD OF ASTRO NAVIGATION,
AD-603 895 DIV. 19

CELLS (BIOLOGY)
GROWTH
CULTIVATION OF DIPLOID CELL STRAIN WI-38, AND ANTIGENIC CHANGES IN THYROID CELLS,
AD-604 179 DIV. 16

CENTRIFUGES
DESIGN
DECONTAMINATION OF HYDRAULIC FLUIDS BY HYDROCYCLONES,
AD-603 702 DIV. 14

CERAMIC MATERIALS
LAMINATES
DEVELOPMENT OF A 1200F RADOME, THERMAL AND PHYSICAL PROPERTIES OF CERAMIC MATRICES AND GLASS REINFORCED LAMINATES,
AD-603 730 DIV. 8

CEREBRAL CORTEX
VISION
EXPERIMENTS ON 'THE CORTICAL CORRELATE OF PATTERN VISION',
AD-604 245 DIV. 16

CERIUM COMPOUNDS
ELECTRIC MOMENTS
ELECTRIC QUADRUPOLE-QUADRUPOLE INTERACTION IN CERIUM ETHYL SULFATE,
AD-604 091 DIV. 25

CESIUM
COMPATIBILITY
FACTORS AFFECTING THE COMPATIBILITY OF LIQUID CESIUM WITH CONTAINMENT METALS,
AD-603 724 DIV. 17

CESIUM
FUELS
EFFECT OF IMPURITIES OF CESIUM FUEL UPON ION ENGINES,
AD-603 631 DIV. 10

CESIUM
METAL FILMS
STUDY OF CESIUM ON REFRACTORY METALS USING FIELD EMISSION MICROSCOPY,
AD-603 902 DIV. 17

CHARGED PARTICLES
MAGNETIC FIELDS
CHARGED PARTICLE MOTION IN AN INHOMOGENEOUS MAGNETIC FIELD,
AD-603 602 DIV. 25

CHARGED PARTICLES
RADIOACTIVE FALLOUT
TIME BEHAVIOR OF CHARGED PARTICLES INJECTED BY 1962 HIGH ALTITUDE RUSSIAN NUCLEAR TESTS,
AD-603 899 DIV. 20

CHEMICAL EQUILIBRIUM
GASES
SIMPLIFIED METHOD FOR COMPUTING THE EQUILIBRIUM COMPOSITION OF GASEOUS SYSTEMS,
AD-603 795 DIV. 4

CHEMICAL WARFARE AGENTS
ADSORPTION
ADSORPTION-DESORPTION PROPERTIES OF SORBENTS FOR CHEMICAL AGENTS,
AD-604 116 DIV. 3

CHEMICAL WARFARE AGENTS
DISTRIBUTION
DISSEMINATION OF SOLID AND LIQUID CW AGENTS,
AD-603 644 DIV. 3

CHEMICAL WARFARE AGENTS
INSTRUMENTATION
INSTRUMENTATION FOR FIELD EVALUATION OF CHEMICAL AGENTS,
AD-604 093 DIV. 3

CHEMOTHERAPY
EXCRETION
THREE-ORGAN DRUG DISTRIBUTION MODEL INCLUDING THE KIDNEY,
AD-603 675 DIV. 16

CHINA
FOREIGN POLICY
COMMUNIST REACH FOR EMPIRE,
AD-603 671 DIV. 18
CHINA'S RELATIONS WITH ASIAN NEIGHBORS,
AD-603 674 DIV. 32

CHLORINE
ATOMIC ENERGY LEVELS
RESONANCES IN THE S32, 33, 34 (P, GAMMA) CL33, 34, 35 REACTIONS WITH BOMBARDING ENERGIES IN THE ONE MEV TO TWO MEV RANGE,
AD-603 601 DIV. 20

CIVIL DEFENSE
DENTAL PERSONNEL
THE ROLE OF THE DENTIST IN NATIONAL DISASTER,
AD-604 274 DIV. 16

CIVIL DEFENSE
MEDICAL PERSONNEL
THE ROLE OF THE PHARMACIST IN NATIONAL DISASTER,
AD-604 275 DIV. 16

CIVIL DEFENSE
VETERINARY MEDICINE
THE ROLE OF THE VETERINARIAN IN NATIONAL DISASTER,
AD-604 276 DIV. 16

CIVIL DEFENSE SYSTEMS
NUCLEAR WARFARE
ARE WE SURE ABOUT DISPERSAL
AD-604 128 DIV. 18

CIVIL DEFENSE SYSTEMS
RADIOLOGICAL WARFARE
A PROTOTYPE CIVIL DEFENSE MANUAL FOR RADIOLOGICAL DECONTAMINATION OF MUNICIPALITIES, VOLUME I, DECONTAMINATION PLANNING,
AD-603 641 DIV. 18
PROTOTYPE CIVIL DEFENSE MANUAL FOR RADIOLOGICAL DECONTAMINATION OF MUNICIPALITIES, VOLUME II, DECONTAMINATION OPERATIONS,
AD-603 642 DIV. 18

CIVIL DEFENSE SYSTEMS
URBAN AREAS
PROTOTYPE MANUAL FOR PLANNING, ANALYZING AND SCHEDULING FOR RADIOLOGICAL EXPOSURE,
AD-603 640 DIV. 18

CLOSED ECOLOGICAL SYSTEMS
EUBACTERIALES
STUDY OF HYDROGEN-FIXING MICROORGANISMS FOR CLOSED REGENERATING BIOSYSTEMS,
AD-603 595 DIV. 16

CLOSTRIDIUM PERFRINGENS
DETECTION
A STUDY OF CHARACTERISTICS AND METHODS OF DETECTION OF FOOD POISONING MICROORGANISMS WITH PARTICULAR EMPHASIS ON CLOSTRIDIUM PERFRINGENS,
AD-604 188 DIV. 16

CLOUD COVER
ULTRAVIOLET RADIATION
INVESTIGATION ON THE INFLUENCE OF CLOUDS ON ULTRAVIOLET SKY RADIATION (AT 330 MILLIMICRONS AND 370 MILLIMICRONS),
AD-603 725 DIV. 2

CNS STIMULANTS
TOLERANCES (PHYSIOLOGY)
EFFECTS OF SOME TRANQUILIZING, ANALEPTIC AND VASODILATING DRUGS ON PHYSICAL WORK CAPACITY AND ORTHOSTATIC TOLERANCE,
AD-603 930 DIV. 16

COATINGS
VANADIUM ALLOYS
HIGH-TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS,
AD-603 774 DIV. 14

COBALT
SINGLE CRYSTALS
MAGNETIC PROPERTIES OF FCC SINGLE CRYSTAL COBALT FILMS,
AD-603 720 DIV. 17

COLD CATHODE TUBES
MICROWAVE EQUIPMENT
THIN-FILM COLD CATHODES FOR MICROWAVE TUBES,
AD-603 762 DIV. 8

COLD WAR
POLITICAL SCIENCE
RATIONALIZING NATO STRATEGY,
AD-603 673 DIV. 18

COLLOIDS
MAGNETOHYDRODYNAMICS
EFFECTS OF PARTIAL CONDENSATION AROUND IONS

DECONTAMINATION
RADIOLOGICAL CONTAMINATION
A PROTOTYPE CIVIL DEFENSE MANUAL FOR RADIOLOGICAL DECONTAMINATION OF MUNICIPALITIES, VOLUME I, DECONTAMINATION PLANNING,
AD-603 641 DIV. 18
PROTOTYPE CIVIL DEFENSE MANUAL FOR RADIOLOGICAL DECONTAMINATION OF MUNICIPALITIES, VOLUME II, DECONTAMINATION OPERATIONS,
AD-603 642 DIV. 18

DELAY LINES
MICROWAVE FREQUENCY
MICROWAVE ACOUSTIC DELAY LINE AND RELATED ACTIVE DEVICES,
AD-604 250 DIV. 8

DELTA WINGS
FLUID DYNAMIC PROPERTIES
WIND-TUNNEL INVESTIGATION OF THE EFFECTS OF LEADING-EDGE BLOWING JETS UPON THE LIFT, DRAG, AND PITCHING MOMENT OF A 76 DEGREE DELTA WING,
AD-603 904 DIV. 1

DENTAL PERSONNEL
CIVIL DEFENSE
THE ROLE OF THE DENTIST IN NATIONAL DISASTER,
AD-604 274 DIV. 14

DENTISTRY
CIVIL DEFENSE
THE ROLE OF THE DENTIST IN NATIONAL DISASTER,
AD-604 274 DIV. 14

DETECTION
SIGNAL-TO-NOISE RATIO
LIMITING FORMS AND NON-GAUSSIAN STATISTICS IN SIGNAL PROCESSING THEORY, I,
AD-603 710 DIV. 8

DETONATION WAVES
MEASUREMENT
SENSITIVITY CHARACTERISTICS OF LIQUID EXPLOSIVE SYSTEMS,
AD-603 757 DIV. 22

DETONATIONS
REVIEWS
REVIEW OF SOVIET-BLOC LITERATURE -NEW COMBUSTION PROCESSES,
AD-604 176 DIV. 10

DEUTERONS
COSMIC RAYS
ISOTOPIC COMPOSITION OF LOW ENERGY HYDROGEN NUCLEI IN THE PRIMARY COSMIC RADIATION,
AD-604 098 DIV. 2

DIELECTRICS
PHYSICAL PROPERTIES
STUDIES ON THE FORMATION AND PROPERTIES OF HIGH-TEMPERATURE DIELECTRICS,
AD-603 899 DIV. 14

DIELECTRICS
WAVEGUIDES
ARTIFICIAL DIELECTRICS FOR MATCHING OR ABSORBING EM DEVICES,
AD-603 718 DIV. 8

DIFFERENCE EQUATIONS
STABILITY
STABILITY THEORY OF DIFFERENTIAL-DIFFERENCE EQUATIONS,
AD-604 207 DIV. 15

DIFFERENTIAL EQUATIONS
GAME THEORY
SOLUTIONS OF GAMES BY DIFFERENTIAL EQUATIONS,
AD-603 877 DIV. 15

DIFFERENTIAL EQUATIONS
INTEGRATION
NOTE ON THE USE OF CHEBYSHEV POLYNOMIALS FOR INTEGRATION OF ORDINARY DIFFERENTIAL EQUATIONS,
AD-603 740 DIV. 15

DIFFERENTIAL EQUATIONS
NEUTRON TRANSPORT THEORY
THEORETICAL CALCULATION OF NEUTRON AGE,
AD-603 603 DIV. 20

DIFFERENTIAL EQUATIONS
NUMERICAL ANALYSIS
NOTE ON THE NUMERICAL TREATMENT OF SECOND-ORDER DIFFERENTIAL EQUATIONS,
AD-604 241 DIV. 15

DIFFERENTIAL EQUATIONS
PROGRAMMING (COMPUTERS)
DYNAMIC FORMULATION OF COEFFICIENT OF RESTITUTION IN MACHINE GUN COMPONENT COLLISIONS,
AD-603 711 DIV. 22
STABILITY THEORY OF DIFFERENTIAL-DIFFERENCE EQUATIONS,
AD-604 207 DIV. 15
EQUILIBRIUM ANALYSIS: THE STABILITY THEORY OF POINCARE-LIAPOUNOFF AND EXTENSIONS,
AD-604 296 DIV. 15

DIFFERENTIAL GEOMETRY
RELAXATION OSCILLATORS
ON CERTAIN RELAXATION OSCILLATIONS: ASYMPTOTIC SOLUTIONS,
AD-603 687 DIV. 15
ON CERTAIN RELAXATION OSCILLATIONS: CONFINING REGIONS,
AD-603 688 DIV. 15

DIFFRACTION
LIGHT
DIFFRACTION OF LIGHT BY SOUND,
AD-603 745 DIV. 25

DIFFRACTION GRATINGS
LASERS
LASER CAVITIES TERMINATED BY DIFFRACTION GRATINGS,
AD-603 967 DIV. 25

DIFFUSION
PARTIAL DIFFERENTIAL EQUATIONS
CONVERGENCE OF A PROCEDURE OF DUFORT AND FRANKEL FOR THE NUMERICAL SOLUTION OF PARABOLIC DIFFERENTIAL EQUATIONS,
AD-604 308 DIV. 15

DIGITAL COMPUTERS
ENGINEERING
APPLICATIONS OF DIGITAL COMPUTERS IN BUSINESS,
AD-604 237 DIV. 30

DIGITAL COMPUTERS
INSTRUMENTATION
A SURVEY OF AUTOMATIC COMPUTERS ANALOG AND DIGITAL,
AD-604 162 DIV. 30

DIGITAL COMPUTERS
OPERATION
RAND'S DIGITAL COMPUTER EFFORT,
AD-604 166 DIV. 30

DIGITAL COMPUTERS
SPACEBORNE
AUTOMATIC RECOVERY FROM TRANSIENT MALFUNCTIONS IN SPACE COMPUTERS,
AD-604 049 DIV. 30

DIGITAL RECORDING SYSTEMS
TERRESTRIAL MAGNETISM
SYSTEM FOR AUTOMATIC COLLECTION OF GEOMAGNETIC DATA IN DIGITAL FORM,
AD-603 727 DIV. 2

DIGITAL SYSTEMS
PHOTOGRAMMETRY
OPTIMIZED DIGITAL AUTOMATIC MAP COMPILATION SYSTEM,
AD-603 861 DIV. 2

DIODES (SEMICONDUCTOR)
LASERS
INJECTION LASER STUDY,
AD-603 451 DIV. 25

DIODES (SEMICONDUCTOR)
SURFACE PROPERTIES
SURFACE STATES ON HIGH-RESISTIVITY GALLIUM ARSENIDE,
AD-603 721 DIV. 8

DIPOLE ANTENNAS
ELECTRICAL IMPEDANCE
CIRCULAR ANTENNA ARRAYS AROUND CYLINDERS,
AD-603 965 DIV. 8

DIPOLE ANTENNAS
PARAMETRIC AMPLIFIERS
DIGITAL COMPUTER DESIGN OF THE DIPOLE PARAMETRIC AMPLIFIER ANTENNA,
AD-604 171 DIV. 8

DIRECTION FINDING
SHIPBORNE
THEORETICAL STUDY, SHIPBOARD DIRECTION FINDING ANTENNA ARRAY,
AD-603 654 DIV. 8

DISPLAY SYSTEMS
AIRBORNE
FOUR-FREQUENCY RADAR MASTER CONSOLE,
AD-603 858 DIV. 4

DISPLAY SYSTEMS
FLIGHT INSTRUMENTS
CONTACT ANALOG SIMULATOR EVALUATIONS: CLIMBOUT, LOW CRUISE AND DESCENT MANEUVERS,
AD-603 744 DIV. 1

DISPLAY SYSTEMS
HUMAN ENGINEERING
STUDIES COMPARING EFFECTIVENESS OF THREE-DIMENSIONAL VERSUS TWO-DIMENSIONAL PRESENTATIONS,
AD-604 017 DIV. 28

DISPLAY SYSTEMS
OPTICAL IMAGES
MATRIX CONTROLLED DISPLAY DEVICE,
AD-603 545 DIV. 24

DISTRIBUTION THEORY
ANALYSIS OF VARIANCE
BAYESIAN ANALYSIS OF RANDOM-EFFECT MODELS IN THE ANALYSIS OF VARIANCE: POSTERIOR DISTRIBUTION OF VARIANCE-COMPONENTS,
AD-604 266 DIV. 15

DISTRIBUTION THEORY
BIBLIOGRAPHIES
PRODUCTS AND QUOTIENTS OF RANDOM VARIABLES AND THEIR APPLICATIONS,
AD-603 667 DIV. 15

DISTRIBUTION THEORY
PROBABILITY
SIMPLE DERIVATION OF THE POISSON DISTRIBUTION,
AD-604 222 DIV. 15

DISTRIBUTION THEORY
STATISTICAL FUNCTIONS
MOMENT CROSSINGS AS RELATED TO DENSITY CROSSINGS,
AD-603 582 DIV. 15

DISTRIBUTION THEORY
STATISTICAL PROCESSES
DISTRIBUTION OF CERTAIN FUNCTIONALS OF MARKOFF PROCESSES,
AD-604 234 DIV. 15

DISTRIBUTION (ECONOMICS)
LINEAR PROGRAMMING
ON THE HITCHCOCK DISTRIBUTION PROBLEM,
AD-603 919 DIV. 15

DOPPLER NAVIGATION
DOPPLER SYSTEMS
INVESTIGATION OF OPTICAL DOPPLER SUBCARRIER REFLECTED SIGNAL LOSS ATTRIBUTED TO COHERENCE EFFECTS AT HIGH MODULATION FREQUENCIES,
AD-604 067 DIV. 19

DOPPLER SYSTEMS
LASERS
INVESTIGATION OF OPTICAL DOPPLER SUBCARRIER REFLECTED SIGNAL LOSS ATTRIBUTED TO COHERENCE EFFECTS AT HIGH MODULATION FREQUENCIES,
AD-604 067 DIV. 19

DOSIMETERS
X RAYS
DOSIMETRY SYSTEM FOR THE FLASH X-RAY,
AD-603 608 DIV. 20

DRAG
CYLINDRICAL BODIES
DRAG FORCES ON CYLINDERS IN VELOCITY GRADIENT FIELDS,
AD-603 778 DIV. 9

DROP TESTING
FUZES (ORDNANCE)
PROCEDURE FOR DEVELOPMENTAL DROP-TESTING SAFETY AND ARMING MECHANISMS CONTAINING TIME-INTEGRATION SYSTEMS,
AD-604 102 DIV. 22

DRUGS
PERFORMANCE (HUMAN)
EFFECTS OF SOME TRANQUILIZING, ANALEPTIC AND VASODILATING DRUGS ON PHYSICAL WORK CAPACITY AND ORTHOSTATIC TOLERANCE,
AD-603 930 DIV. 14

DYNAMIC PROGRAMMING
CALCULUS OF VARIATIONS
VARIATIONAL PROBLEMS WITH STATE VARIABLE INEQUALITY CONSTRAINTS,
AD-603 722 DIV. 15
SOME VARIATIONAL PROBLEMS OCCURRING IN THE THEORY OF DYNAMIC PROGRAMMING
AD-604 206 DIV. 15
DYNAMIC PROGRAMMING AND A NEW FORMALISM IN THE CALCULUS OF VARIATIONS,
AD-604 282 DIV. 15
MONOTONE CONVERGENCE IN DYNAMIC PROGRAMMING AND THE CALCULUS OF VARIATIONS,
AD-604 318 DIV. 15

DYNAMIC PROGRAMMING
EQUATIONS
FUNCTIONAL EQUATION DUMING DYNAMIC PROGRAMMING PROBLEMS OF NON-LINEAR UTILITY FUNCTIONS,
AD-604 146 DIV. 15
CONTINUOUS GOLD-MINING EQUATION,
AD-604 239 DIV. 15

DYNAMIC PROGRAMMING
INVENTORY CONTROL
BOTTLENECK PROBLEMS, FUNCTIONAL EQUATIONS AND DYNAMIC PROGRAMMING,
AD-604 300 DIV. 15

DYNAMIC PROGRAMMING
LINEAR PROGRAMMING
DYNAMIC LINEAR PROGRAMMING PROBLEMS,
AD-603 981 DIV. 15

CONVEX SETS
THEOREMS
SOME APPLICATIONS OF A THEOREM ON CONVEX FUNCTIONS,
AD-603 822 DIV. 18

CORROSION
GAS TURBINES
EFFECT OF JP-5 PROPERTIES ON HOT GAS CORROSION AND FLAME RADIATION,
AD-603 650 DIV. 10

CORROSION
STRESSES
STRESS CORROSION TESTS SOME WROUGHT MG-LI BASE ALLOYS,
AD-603 551 DIV. 17

CORROSION-RESISTANT ALLOYS
CESIUM
FACTORS AFFECTING THE COMPATIBILITY OF LIQUID CESIUM WITH CONTAINMENT METALS,
AD-603 724 DIV. 17

COSMIC RAYS
ABSORPTION
RELATIONSHIP BETWEEN ABSOLUTE SOLAR COSMIC RAY INTENSITY AND RIOMETER ABSORPTION,
AD-604 197 DIV. 2

COSMIC RAYS
ISOTOPES
ISOTOPIC COMPOSITION OF LOW ENERGY HYDROGEN NUCLEI IN THE PRIMARY COSMIC RADIATION,
AD-604 098 DIV. 2

COSTS
PROGRAMMING (COMPUTERS)
FACTORS THAT AFFECT THE COST OF COMPUTER PROGRAMMING,
AD-603 707 DIV. 30

COSTS
TRANSPORTATION
CONTINUOUS MODEL OF TRANSPORTATION; COST ANALYSIS,
AD-604 079 DIV. 33

CREEP
STRUCTURAL PARTS
EFFECT OF CREEP ON COLUMN DEFLECTION,
AD-603 811 DIV. 25

CREEP
SURFACE PROPERTIES
ILLUSTRATED GLOSSARY OF FRACTOGRAPHIC TERMS; SECTION 2: GLIDE PLANE DECOHESION, SERPENTINE GLIDE, RIPPLES, STRETCHING, MICROVOID COALESCENCE,
AD-603 777 DIV. 17

CRIMINOLOGY
GALVANIC SKIN RESPONSE
AN ASSESSMENT OF LIE DETECTION CAPABILITY (DECLASSIFIED VERSION),
AD-603 860 DIV. 30

CRITICAL ASSEMBLIES
THEORY
NUCLEAR CHITICALITY CALCULATIONS ON A SPHERICALLY SYMMETRIC GASEOUS-CORE REACTOR,
AD-603 614 DIV. 20

CRYOGENICS
TITANIUM ALLOYS
STUDY OF TITANIUM ALLOY TANKAGE AT CRYOGENIC TEMPERATURES,
AD-604 053 DIV. 17
EFFECT OF HYDROGEN CONTENT ON THE MECHANICAL PROPERTIES OF TI-6AL-4V BAR AT -423F,
AD-604 054 DIV. 17

CRYOPUMPING
MATHEMATICAL MODELS
CRYOPUMPING CAPTURE COEFFICIENTS OF TWO NITROGEN-OXYGEN GAS MIXTURES,
AD-603 623 DIV. 25

CRYOSTATS
REACTOR SYSTEM COMPONENTS
DESIGN OF A CRYOSTAT FOR THE AIR FORCE NUCLEAR ENGINEERING TEST FACILITY,
AD-603 609 DIV. 20

CRYSTAL GROWTH
CRYOGENICS
CRYOGENIC METHOD FOR RAMAN STUDIES OF MOLECULAR CRYSTALS,
AD-604 273 DIV. 25

CRYSTAL HOLDERS
MANUFACTURING METHODS
CRYSTAL UNITS TYPE CR-(XM-11)/U, 1 TO 20 MC IN THE TYPE MC-27/U GLASS HOLDERS;
AD-603 677 DIV. 8

CRYSTAL LATTICE DEFECTS
METALLIC CRYSTALS
RESEARCH ON DISLOCATIONS IN FATIGUE-HARDENED AL, AND FATIGUE CRACK PROPAGATION,
AD-603 322 DIV. 17

CRYSTAL LATTICE DEFECTS
TUNGSTATES
PLASTIC DEFORMATION OF CALCIUM TUNGSTATE SINGLE CRYSTALS,
AD-604 103 DIV. 25

CRYSTAL LATTICES
ELECTRIC MOMENTS
ELECTRIC QUADRUPOLE-QUADRUPOLE INTERACTION IN CERIUM ETHYL SULFATE,
AD-604 091 DIV. 25

CRYSTAL LATTICES
FIELD THEORY
REDUCTION OF KRONECKER PRODUCTS OF SPACE GROUP REPRESENTATIONS IN THE FRAME-WORK OF LITTLE GROUP THEORY,
AD-603 556 DIV. 25

CRYSTAL LATTICES
IMPURITIES
DEPENDANCE OF SPIN-LATTICE RELAXATION TIME UPON MAGNETIC FIELD FOR NEODYMIUM (3+) ION IN MG3LA2(NO3)12 AND IN LAF3,
AD-604 089 DIV. 25
NON-DIPOLAR INTERACTION BETWEEN NEAREST NEIGHBOR NEODYMIUM IONS IN LANTHANUM ETHYL SULFATE,
AD-604 090 DIV. 25
VANADIUM SOLID-STATE CHEMISTRY BY PARAMAGNETIC RESONANCE,
AD-604 181 DIV. 25

CRYSTAL LATTICES
OPTICAL PROPERTIES
REFLECTION AND TRANSMISSION BY LAYERED CRYSTAL STRUCTURES,
AD-604 177 DIV. 25

CRYSTAL LATTICES
POLARIZATION
EFFECTIVE POLARIZING FIELD IN CRYSTALS WITH OVERLAPPING ATOMS,
AD-603 872 DIV. 25
NUCLEAR POLARIZATION IN LANTHANUM MAGNESIUM NITRATE CRYSTALS,
AD-604 092 DIV. 25

CRYSTALS
ANISOTROPY
FERRIMAGNETIC RESONANCE RELATIONS FOR MAGNETOCRYSTALLINE ANISOTROPY IN CUBIC CRYSTALS,
AD-603 593 DIV. 25

CRYSTALS
SEMICONDUCTOR DEVICES
CRYSTAL UNITS TYPE CR-(XM-11)/U, 1 TO 20 MC IN THE TYPE MC-27/U GLASS HOLDERS,
AD-603 677 DIV. 8

CURVE FITTING
GRAPHICS
INCOMPLETE APPROXIMATOR (IN SIX FITS); CURVE FITTING TECHNIQUES,
AD-604 216 DIV. 15

CYBERNETICS
THEORY
TRANSLATION OF RUSSIAN RESEARCH: MAN AND THE MACHINE, A CONFERENCE DEVOTED TO PHILOSOPHICAL PROBLEMS IN CYBERNETICS,
AD-603 665 DIV. 30

CYLINDRICAL BODIES
ACOUSTICS
SOUND RADIATION FROM SUBMERGED CYLINDRICAL SHELLS OF FINITE LENGTH,
AD-603 531 DIV. 25

CYLINDRICAL BODIES
BUCKLING (MECHANICS)
BUCKLING CHARACTERISTICS OF CORRUGATED CYLINDERS -EFFECT OF USING A HIGH STRENGTH MATERIAL,
AD-603 626 DIV. 13

CYLINDRICAL BODIES
DRAG
DRAG FORCES ON CYLINDERS IN VELOCITY GRADIENT FIELDS,
AD-603 778 DIV. 9

CYLINDRICAL BODIES
SANDWICH CONSTRUCTION
BUCKLING OF AXIALLY COMPRESSED SANDWICH,
AD-604 014 DIV. 25

CYLINDRICAL BODIES
VIBRATION
TORSIONAL VIBRATIONS OF A HOLLOW VISCOELASTIC CYLINDER,
AD-603 854 DIV. 25

DAMPING
MATHEMATICAL ANALYSIS
STEADY-STATE MOTIONS OF LARGE ELASTIC BODIES, PART A: DAMPING IN STEADY-STATE MOTIONS, PART B: A STEADY-STATE ANALOGUE TO ST. VENANT'S PRINCIPLE,
AD-603 743 DIV. 25

DAMPING
VELOCITY
FEASIBILITY STUDIES OF A VELOCITY-DAMPED INERTIAL NAVIGATION SYSTEM,
AD-603 959 DIV. 19

DATA PROCESSING SYSTEMS
INPUT-OUTPUT DEVICES
JOSS: A DESIGNER'S VIEW OF AN EXPERIMENTAL ON-LINE COMPUTING SYSTEM,
AD-603 972 DIV. 30

DATA PROCESSING SYSTEMS
MANAGEMENT ENGINEERING
USER-ORIENTED INFORMATION PROCESSING SYSTEM FOR MANAGERIAL PERSONNEL,
AD-604 277 DIV. 26

DATA PROCESSING SYSTEMS
MATHEMATICS
PERMANENT SET-UPS FOR IBM CALCULATORS,
AD-604 202 DIV. 30

DATA TRANSMISSION SYSTEMS
STRATEGIC AIR COMMAND
TEST REPORT FOR CATEGORY I ON-SITE ACCEPTANCE AND INTEGRATION TESTING OF THE DIGITAL DATA TRANSFER SYSTEM SUBSCRIBER A (AN/FYQ-2) WITH THE REMOTE COMMUNICATIONS CENTRAL (AN/FYQ-4) AND THE ELECTRONIC DATA TRANSMISSION COMMUNICATIONS
AD-603 850 DIV. 5

DECISION MAKING
GAME THEORY
TWO-PERSON GAMES INVOLVING BLUFFING,
AD-603 826 DIV. 15

DECISION MAKING
GROUP DYNAMICS
PREFERENCE EXPERIMENTS,
AD-603 997 DIV. 28
PREFERENCE EXPERIMENTS,
AD-603 998 DIV. 28
PREFERENCE EXPERIMENT,
AD-604 002 DIV. 28

DECISION MAKING
MATHEMATICAL MODELS
TESTING ORGANIZATION THEORIES,
AD-604 135 DIV. 28

DECISION MAKING
PSYCHOMETRICS
THE INFLUENCE OF ENVIRONMENTAL NON-STATIONARITY IN A SEQUENTIAL DECISION-MAKING EXPERIMENT,
AD-604 156 DIV. 28

DECISION THEORY
COMMERCE
DETERMINATION OF MANY-COMMODITY PREFERENCE SCALES BY TWO-COMMODITY COMPARISONS,
AD-603 810 DIV. 32

DECISION THEORY
MATHEMATICAL LOGIC
THE PROBLEM OF IDENTIFICATION OF DISCRETE-TIME PROCESSES,
AD-603 739 DIV. 15

DECISION THEORY
MATHEMATICAL MODELS
BEHAVIORAL MODEL OF RATIONAL CHOICE,
AD-604 198 DIV. 15

DECISION THEORY
MATHEMATICAL PREDICTION
BAYESIAN APPROACH TO PROBLEMS IN STOCHASTIC ESTIMATION AND CONTROL,
AD-604 006 DIV. 15

DECISION THEORY
SEQUENTIAL ANALYSIS
BAYES AND MINIMAX SOLUTIONS OF SEQUENTIAL DECISION PROBLEMS,
AD-603 804 DIV. 15
BAYES MODEL IN SEQUENTIAL DESIGN,
AD-604 145 DIV. 15

DECISION THEORY
SOCIAL SCIENCES
POSSIBILITY OF DEVELOPING A UNIVERSAL SOCIAL WELFARE FUNCTION; ANALYSIS OF PREFERENCE RELATIONS,
AD-603 806 DIV. 32

DECISION THEORY
STOCHASTIC PROCESSES
GAME-LEARNING THEORY AND DECISION-MAKING EXPERIMENTS,
AD-604 157 DIV. 28

DECONTAMINATION
BIOLOGICAL WARFARE AGENTS
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES,
AD-603 661 DIV. 3

BEAM MICROWAVE TUBES,
AD-603 712 DIV. 6

ELECTRONIC EQUIPMENT
RADIOFREQUENCY INTERFERENCE
INTERFERENCE CONSIDERATIONS IN TERMINAL EQUIPMENT DESIGN,
AD-603 866 DIV. 8

ELECTRONIC SWITCHES
FERRITES
HIGH POWER FAST FERRITE SWITCHES, MICROWAVE DEVELOPMENT OF C-BAND AND S-BAND SPOT SWITCHES,
AD-603 927 DIV. 8

ELECTRONIC SWITCHES
SEMICONDUCTOR DEVICES
PRODUCTION ENGINEERING MEASURE, HIGH SPEED SEMICONDUCTOR SWITCH (TWO TERMINAL) HIGH SPEED SEMICONDUCTOR SWITCH (GATE),
AD-603 660 DIV. 8

ELECTRONIC SWITCHES
TRIODES
BILATERAL TRIODE SWITCH,
AD-603 340 DIV. 8

ELECTRONICS
INDUSTRIES
RESEARCH AND DEVELOPMENT IN THE CHICAGO AREA ELECTRONICS INDUSTRY,
AD-603 732 DIV. 30
JOINT SERVICES ELECTRONICS PROGRAM RESEARCH SUMMARY,
AD-603 736 DIV. 8
QUARTERLY PROGRESS REPORT NO. 74, RADIO PHYSICS, PLASMA DYNAMICS, AND COMMUNICATION SCIENCES AND ENGINEERING ,
AD-603 870 DIV. 30

ELECTRONS
PARTICLE TRAJECTORIES
TABLES OF NON-RELATIVISTIC ELECTRON TRAJECTORIES FOR FIELD EMISSION CATHODES,
AD-604 256 DIV. 8

ELECTROSTATIC GENERATORS
DESIGN
ELECTROSTATIC POWER GENERATOR,
AD-603 643 DIV. 7

ENERGY CONVERSION
MAGNETOHYDRODYNAMICS
EFFECTS OF PARTIAL CONDENSATION AROUND IONS IN ELECTROFLUID DYNAMIC ENERGY CONVERSION PROCESSES,
AD-603 681 DIV. 25

ENERGY CONVERSION
PLASMA PHYSICS
PLASMA KINETIC ENERGY-MICROWAVE CONVERSION,
AD-604 120 DIV. 8

EPOXIDES
MOLECULAR STRUCTURE
RELATIONSHIP OF MOLECULAR STRUCTURE TO PHYSICAL PROPERTIES IN NOVEL EPOXY RESINS,
AD-603 748 DIV. 14

EPOXY PLASTICS
PHYSICAL PROPERTIES
RELATIONSHIP OF MOLECULAR STRUCTURE TO PHYSICAL PROPERTIES IN NOVEL EPOXY RESINS,
AD-603 748 DIV. 14

EQUATIONS
ECONOMICS
DEFINITE AND SEMI-DEFINITE QUADRATIC EQUATIONS,
AD-603 992 DIV. 15

EQUATIONS
HEAT
TRANSLATION OF RUSSIAN RESEARCH; SIMILARITY THEORY AND ITS APPLICATION IN HEAT ENGINEERING,
AD-604 024 DIV. 25

EUBACTERIALES
CLOSED ECOLOGICAL SYSTEMS
STUDY OF HYDROGEN-FIXING MICROORGANISMS FOR CLOSED REGENERATIVE BIOSYSTEMS,
AD-603 595 DIV. 16

EUROPIUM
ATOMIC PROPERTIES
SPECTRA AND ENERGY LEVELS OF EU(3+) IN Y2O3,
AD-603 978 DIV. 4

EXCRETION
DRUGS
THREE-ORGAN DRUG DISTRIBUTION MODEL INCLUDING THE KIDNEY,
AD-603 675 DIV. 16

EXERCISE
TOLERANCES (PHYSIOLOGY)
EFFECT OF AGE AND ALTITUDE ON WORK TOLERANCE,
AD-603 932 DIV. 16

EXOSPHERE
CHARGED PARTICLES
DISTRIBUTION OF IONS AND ELECTRONS IN THE EARTH'S EXOSPHERE,
AD-604 040 DIV. 2

EXPANDED PLASTICS
VIBRATION ISOLATORS
RESPONSE OF FOAM-ISOLATED TUNNEL LININGS TO TRANSIENT LOADINGS,
AD-603 539 DIV. 13

EXPLOSION EFFECTS
EXPLOSIVE MATERIALS
CHAPMAN-JOUGUET PRESSURES OF SEVERAL PURE AND MIXED EXPLOSIVES,
AD-603 540 DIV. 22

EXPLOSIVE INITIATORS
ELECTRICAL PROPERTIES
THE FIRING CHARACTERISTICS OF THE STANDARD ATLAS ELECTRIC MATCH,
AD-603 638 DIV. 22
BEHAVIOR OF PLEXIGLAS UNDER SHOCK LOADING BY A TETRYL DONOR,
AD-603 656 DIV. 22
SENSITIVITY CHARACTERISTICS OF LIQUID EXPLOSIVE SYSTEMS,
AD-603 757 DIV. 22

EXPOSURE SUITS
PRESSURE SUITS
X-20A FULL-PRESSURE SUIT QUANTITATIVE PERFORMANCE,
AD-603 701 DIV. 16

EXTRUSION
METAL-FORMING PRESSES
DEVELOPMENT OF IMPROVED LINER FOR EXTRUSION BILLET CONTAINERS,
AD-604 172 DIV. 24

FAILURE (MECHANICS)
AIRFRAMES
RANDOM FATIGUE FAILURE OF A MULTIPLE LOAD PATH REDUNDANT STRUCTURE, AIRCRAFT STRUCTURAL MATERIALS 7075-T6 AND 2024-T4 ALUMINUM AND SAE 4340 STEEL WERE USED,
AD-604 125 DIV. 17

FAR EAST
LIMITED WAR
THE LESSER EVIL! UN INTERVENTION IN KOREA,
AD-603 908 DIV. 32

FERRITES
ANTENNA COMPONENTS
STUDY AND INVESTIGATION OF A UHF-VHF ANTENNA,
AD-603 742 DIV. 8

FERROCENES
ELECTRICAL CONDUCTANCE
MEASUREMENTS OF TRUE DARK CONDUCTIVITIES IN FERROCENE CRYSTALS,
AD-603 815 DIV. 25

FERROMAGNETIC MATERIALS
MAGNETIC RESONANCE
FERRIMAGNETIC RESONANCE RELATIONS FOR MAGNETOCRYSTALLINE ANISOTROPY IN CUBIC CRYSTALS,
AD-603 593 DIV. 25

FERROMAGNETIC MATERIALS
RARE EARTH ELEMENTS
MAGNETIC PROPERTIES OF RARE EARTH-IRON ALLOYS,
AD-603 612 DIV. 17

FIBER METALLURGY
COMPOSITE MATERIALS
FIBER-REINFORCED METALS AND ALLOYS,
AD-604 190 DIV. 17

FIELD THEORY
MATHEMATICAL ANALYSIS
SINGULAR LOGARITHMIC POTENTIALS AND PERATIZATION,
AD-604 099 DIV. 25

FILAMENT WOUND CONSTRUCTION
LAMINATED PLASTICS
INTERLAMINAR SHEAR OF FILAMENT-WOUND REINFORCED PLASTICS,
AD-603 564 DIV. 14
RELATIONSHIP OF MOLECULAR STRUCTURE TO PHYSICAL PROPERTIES IN NOVEL EPOXY RESINS,
AD-603 748 DIV. 14

FILAMENT WOUND CONSTRUCTION
PRESSURE VESSELS
HYDROSTATIC TEST PROCEDURES ON GLASS-FILAMENT-WOUND CHAMBERS,
AD-604 104 DIV. 14

FILMS
CATHODES (ELECTRON TUBES)
THIN-FILM COLD CATHODES FOR MICROWAVE TUBES,
AD-603 762 DIV. 8

FILMS
MEASUREMENT
MULTIPLE BEAM INTERFERENCE MEASUREMENT TECHNIQUE FOR VACUUM-DEPOSITED THIN FILMS,
AD-603 706 DIV. 30

FILTERS (ELECTROMAGNETIC WAVE)
TRANSIENTS
TRANSIENT RESPONSE OF BUTTERWORTH APPROXIMATIONS OF IDEAL LOW-PASS FILTERS,
AD-604 153 DIV. 8

FIRE EXTINGUISHERS
AIRCRAFT EQUIPMENT
SIMULATED FLIGHT TEST INVESTIGATION OF THE EFFECTIVENESS OF A LIGHTWEIGHT, AIRCRAFT, FIXED, FIRE-EXTINGUISHING SYSTEM,
AD-603 558 DIV. 1
EVALUATION OF LIGHTWEIGHT FIRE EXTINGUISHING SYSTEM UNDER SIMULATED FLIGHT CONDITIONS,
AD-603 746 DIV. 1

FISSION
DECAY SCHEMES
SPONTANEOUS FISSION VERSUS ALPHA-DECAY,
AD-604 133 DIV. 20

FISSION NEUTRONS
NEUTRON AGE
THEORETICAL CALCULATION OF NEUTRON AGE,
AD-603 603 DIV. 20

FLARES
TEMPERATURE
DETERMINATION OF THE EFFECTIVE EMITTING TEMPERATURE OF A RADIATING BODY,
AD-604 015 DIV. 25

FLASH RADIOGRAPHY
DOSIMETERS
DOSIMETRY SYSTEM FOR THE FLASH X-RAY,
AD-603 608 DIV. 20

FLAT PLATE MODELS
COMPRESSIBLE FLOW
SOLUTION OF THE LAMINAR BOUNDARY LAYER EQUATIONS FOR A COMPRESSIBLE FLUID WITH VARIABLE PROPERTIES, INCLUDING DISSOCIATION,
AD-604 061 DIV. 9

FLIGHT CONTROL SYSTEMS
AEROSPACE PLANES
X-20 FLIGHT CONTROL SYSTEM DEVELOPMENT,
AD-603 704 DIV. 1

FLIGHT CONTROL SYSTEMS
ANALYSIS
COMPARISON OF HIGH-GAIN-LINEAR AND SELF-ADAPTIVE FLIGHT CONTROL SYSTEMS WITH NONLINEARITIES INTRODUCED,
AD-603 953 DIV. 12

FLIGHT CONTROL SYSTEMS
AUTOMATIC
AN AUTOMATIC FLIGHT CONTROL SYSTEM TO SIMULATE SUB-EARTH GRAVITY ENVIRONMENTS IN THE KC-135 AIRCRAFT,
AD-603 932 DIV. 12

FLIGHT CONTROL SYSTEMS
DESIGN
FIXED-GAIN LATERAL-AUGMENTATION SYSTEM FOR THE B-58 AIRCRAFT,
AD-603 958 DIV. 1

FLIGHT CONTROL SYSTEMS
JET BOMBERS
APPLICATION OF THE LIMIT-CYCLE SELF-ADAPTIVE CONCEPT TO THE B-58 LATERAL DIRECTIONAL STABILITY AUGMENTATION SYSTEM,
AD-604 253 DIV. 1

FLIGHT SIMULATORS
HELICOPTERS
CONTACT ANALOG SIMULATOR EVALUATIONS! CLIMBOUT, LOW CRUISE AND DESCENT MANEUVERS,
AD-603 744 DIV. 1

FLUID EMISSION
CATHODES (ELECTRON TUBES)
TABLES OF NON-RELATIVISTIC ELECTRON TRAJECTORIES FOR FIELD EMISSION CATHODES,
AD-604 256 DIV. 8

FLUID FLOW
ACOUSTIC PROPERTIES
FLOW NOISE STUDY OF WATER FLOWING THROUGH PIPES,
AD-603 589 DIV. 9

FLUID FLOW
DUCTS
SIMULATION OF COMBUSTION MODELS IN WIND TUNNELS,
AD-603 813 DIV. 10

FLUID FLOW
HARMONIC ANALYSIS
NON-LINEAR EQUATION OCCURRING IN THE HARMONIC ANALYSIS OF VISCOUS FLUID FLOW,
AD-603 891 DIV. 9

FLUID FLOW
OSCILLATION
TWO-PHASE GAS-LIQUID FLOW OSCILLATIONS! PRELIMINARY SURVEY,
AD-603 652 DIV. 9

DYNAMIC PROGRAMMING
LOGISTICS
APPLICATIONS OF THE THEORY OF DYNAMIC PROGRAMMING TO LOGISTICS,
AD-604 285 DIV. 15

DYNAMIC PROGRAMMING
SCHEDULING
COMPUTATIONAL TECHNIQUES FOR SCHEDULING PROBLEMS WITH DEFERRAL COSTS,
AD-603 525 DIV. 26
COMBINATORIAL PROBLEMS ARISING IN THE THEORY OF MULTISTAGE PROCESSES,
AD-604 284 DIV. 26

DYNAMIC PROGRAMMING
THEORY
BOTTLENECK PROBLEMS AND DYNAMIC PROGRAMMING,
AD-604 219 DIV. 15
COMPUTATIONAL PROBLEMS IN THE THEORY OF DYNAMIC PROGRAMMING,
AD-604 231 DIV. 15
FUNCTIONAL EQUATION IN THE THEORY OF DYNAMIC PROGRAMMING AND ITS GENERALIZATIONS,
AD-604 238 DIV. 15
A FUNCTIONAL EQUATION IN THE THEORY OF DYNAMIC PROGRAMMING AND ITS GENERALIZATIONS,
AD-604 236 DIV. 15
PROBLEMS IN THE THEORY OF DYNAMIC PROGRAMMING,
AD-604 293 DIV. 15
THEORY OF DYNAMIC PROGRAMMING AS APPLIED TO A SMOOTHING PROBLEM,
AD-604 305 DIV. 15

EAR
BIONICS
MODEL OF THE INTRA-AURAL REFLEX,
AD-603 955 DIV. 30

EARTHQUAKES
LIBYA
LIBYAN EARTHQUAKE OF FEBRUARY 21, 1963,
AD-603 695 DIV. 2

ECONOMICS
BANKING
DEPRECIATION, REPLACEMENT AND GROWTH,
AD-604 143 DIV. 32

ECONOMICS
COMMERCE
COEFFICIENT OF RESOURCE UTILIZATION,
AD-603 914 DIV. 32

ECONOMICS
CONSUMPTION
EXCHANGE BETWEEN QUANTITY AND QUALITY,
AD-604 218 DIV. 32

ECONOMICS
DECISION MAKING
POSSIBILITY OF DEVELOPING A UNIVERSAL SOCIAL WELFARE FUNCTION: ANALYSIS OF PREFERENCE RELATIONS,
AD-603 806 DIV. 32
DETERMINATION OF MANY-COMMODITY PREFERENCE SCALES BY TWO-COMMODITY COMPARISONS,
AD-603 810 DIV. 32

ECONOMICS
GAME THEORY
CONFLICTS WITH IMPRECISE PAYOFFS IN GAME THEORY,
AD-604 141 DIV. 15

ECONOMICS
INDUSTRIAL PRODUCTION
COMPARISONS OF INPUT-OUTPUT AND ALTERNATIVE PROJECTIONS,
AD-603 987 DIV. 26
EFFICIENT ALLOCATION OF RESOURCES,
AD-604 062 DIV. 32

ECONOMICS
LINEAR PROGRAMMING
CONCAVE PROGRAMMING FOR GASOLINE BLENDS,
AD-604 208 DIV. 10

ECONOMICS
MATHEMATICAL LOGIC
ABSTRACT PROOFS OF THE LAW OF DIMINISHING RETURNS,
AD-604 081 DIV. 32

ECONOMICS
MATHEMATICAL MODELS
COMMENTS ON SOLOW 'STRUCTURE OF LINEAR MODELS',
AD-604 086 DIV. 32
ACTIVITY ANALYSIS OF TECHNOLOGICAL STRUCTURES IN PRODUCTION: AN EXAMPLE,
AD-604 150 DIV. 32
CLASSICAL TAX SUBSIDY PROBLEM,
AD-604 163 DIV. 32
MATHEMATICAL METHODS AND TECHNIQUES IN ECONOMICS,
AD-604 210 DIV. 15

ECONOMICS
MEASURE THEORY
AXIOMATIC APPROACH TO MEASURABLE UTILITY,
AD-604 140 DIV. 15

ECONOMICS
MOBILIZATION
TAXATION AND INCENTIVE IN MOBILIZATION,
AD-603 911 DIV. 32

ECONOMICS
PETROLEUM INDUSTRY
PETROLEUM REFINERY OPERATIONS SCHEDULING, CHAPTER IV, A NAPHTHA REFORMING PROBLEM,
AD-604 304 DIV. 26

ECONOMICS
RAILROADS
ALLOCATION OF SWITCHING WORK IN A SYSTEM OF RAILROAD CLASSIFICATION YARDS,
AD-604 246 DIV. 33

ECONOMICS
REFINERIES
PETROLEUM REFINERY OPERATIONS SCHEDULING, CHAPTER II, CONVENTIONAL METHODS OF REFINERY ECONOMIC ANALYSIS,
AD-604 298 DIV. 26

ECONOMICS
USSR
CHOICE AMONG INVESTMENT ALTERNATIVES IN SOVIET ECONOMIC THEORY,
AD-603 892 DIV. 32
SOVIET CONCEPT OF ECONOMIC REGIONALIZATION,
AD-604 003 DIV. 32
ARITHMANCY, THEOMANCY AND THE SOVIET ECONOMY,
AD-604 149 DIV. 32

EDUCATION
MODELS (SIMULATIONS)
RESEARCH ON COMPUTER MODELS OF TEACHING,
AD-603 569 DIV. 23

ELASTIC SHELLS
THEORY
LINEAR THEORY OF ELASTIC SHELLS,
AD-603 929 DIV. 25

ELASTICITY
MODELS (SIMULATIONS)
PHYSICAL MODEL OF A 3-CONSTANT ISOTROPIC ELASTIC MATERIAL,
AD-603 761 DIV. 25

ELASTICITY
STRUCTURAL SHELLS
COMPARISONS OF ELASTICITY AND SHELL THEORY SOLUTIONS,
AD-603 853 DIV. 25

ELASTICITY
THEORY
STEADY-STATE MOTIONS OF LARGE ELASTIC BODIES, PART A: DAMPING IN STEADY-STATE MOTIONS, PART B: A STEADY-STATE ANALOGUE TO ST. VENANT'S PRINCIPLE,
AD-603 743 DIV. 25

ELASTOMERS
MECHANICAL PROPERTIES
RHEOLOGICAL BEHAVIOR OF A FILLED ELASTOMER: MODELING OF SOLID ROCKET PROPELLANTS,
AD-604 019 DIV. 10
SOLID PROPELLANT MECHANICAL PROPERTIES; STRAIN RATE INVESTIGATIONS WITH NH4CLO4/AL-FILLED POLYBUTADIENE AND POLYURETHANE,
AD-604 109 DIV. 10

ELECTRIC DISCHARGES
PRODUCTION
LASER TRIGGERED SPARK GAP,
AD-603 613 DIV. 25

ELECTRIC PROPULSION
MANEUVERING SATELLITES
RADIAL AND BINORMAL THRUSTING TECHNIQUES FOR MANEUVERING SATELLITES IN NEAR EARTH SPACE,
AD-603 699 DIV. 27

ELECTRIC PROPULSION
TEST FACILITIES
BASIC PROCESSES OF ION BEAM TERMINATION WITH APPLICATION TO ELECTRIC PROPULSION TEST FACILITY COLLECTOR SYSTEMS,
AD-603 905 DIV. 27

ELECTRICAL NETWORKS
MATHEMATICAL ANALYSIS
NONLINEAR NETWORK ANALYSIS: THE PARAMETRIC APPROACH,
AD-604 039 DIV. 7

ELECTRICAL NETWORKS
MATRIX ALGEBRA
REALIZATION OF THE A-MATRIX OF HALF-DEGENERATE RLC NETWORKS,
AD-603 486 DIV. 7

ELECTRICAL NETWORKS
SYNTHESIS
USE OF SENSITIVITY AS A CRITERION IN THE SYNTHESIS OF ACTIVE NETWORKS,
AD-603 857 DIV. 8

ELECTRODES
RADIATION DAMAGE
RADIATION EFFECTS ON NICKEL-CADMIUM BATTERY ELECTRODES AND ON AQUEOUS KOH ELECTROLYTE,
AD-604 037 DIV. 7

ELECTROENCEPHALOGRAPHY
SLEEP
NEUROPHYSIOLOGICAL INHIBITORY SYSTEMS ACTIVE DURING SLEEP,
AD-603 737 DIV. 14

ELECTROENCEPHALOGRAPHY
VISION
EXPERIMENTS ON 'THE CORTICAL CORRELATE OF PATTERN VISION',
AD-604 245 DIV. 16

ELECTROLYTES
FUEL CELLS
STUDY OF HYDROGEN-OXYGEN FUEL CELL ELECTRODES,
AD-603 630 DIV. 7

ELECTROLYTES
RADIATION CHEMISTRY
RADIATION EFFECTS ON NICKEL-CADMIUM BATTERY ELECTRODES AND ON AQUEOUS KOH ELECTROLYTE,
AD-604 037 DIV. 7

ELECTROLYTES
RELAXATION TIME
STUDIES OF RELAXATION EFFECTS IN ELECTROLYTIC SOLUTIONS WITH THE PRESSURE-STEP METHOD,
AD-604 113 DIV. 4

ELECTROLYTIC CELLS
GAS DETECTORS
INSTRUMENTATION FOR FIELD EVALUATION OF CHEMICAL AGENTS,
AD-604 093 DIV. 3

ELECTROMAGNETIC FIELDS
BEAMS (ELECTROMAGNETIC)
THEORETICAL STUDIES OF THE ELECTROMAGNETIC FIELD IN THE FOCAL REGION OF COHERENT LIGHT BEAMS,
AD-603 530 DIV. 25

ELECTROMAGNETIC WAVES
POLARIZATION
GEOMETRIC STUDY OF COHERENCE PROPERTIES OF PARTIALLY POLARIZED ELECTROMAGNETIC RADIATION,
AD-603 588 DIV. 25

ELECTROMAGNETIC WAVES
PROPAGATION
FREE AND DRIVEN MODES IN ANISOTROPIC PLASMA GUIDES AND RESONATORS,
AD-604 087 DIV. 8

ELECTROMAGNETIC WAVES
RADIATION DAMAGE
EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF RADIATION OF THE PROPAGATION OF ELECTROMAGNETIC SIGNALS IN AIR,
AD-603 770 DIV. 20

ELECTROMAGNETIC WAVES
RADIATION MEASUREMENT SYSTEMS
DEVELOPMENT OF EQUIPMENT TO CONDUCT AREA SURVEY MEASUREMENTS OF THE ELECTROMAGNETIC PULSES FROM NUCLEAR EXPLOSIONS,
AD-603 928 DIV. 20

ELECTRON BEAMS
KLYSTRONS
SMALL-SIGNAL NONLINEAR KLYSTRON WAVES,
AD-603 573 DIV. 8

ELECTRON BEAMS
PLASMA PHYSICS
PROPAGATION OF NONLINEAR HAHN-RAMO WAVES ALONG AN ANNULAR ELECTRON CURRENT SHEATH,
AD-603 572 DIV. 8

ELECTRON BOMBARDMENT
TUNGSTEN
EFFECT OF ELECTRON BOMBARDMENT HEATING ON SURFACES OF TUNGSTEN,
AD-604 170 DIV. 17

ELECTRON DENSITY
IONOSPHERE
METHODS FOR OBTAINING ELECTRON DENSITY PROFILES FROM CAPACITIVE IONOSPHERIC ROCKET PROBES,
AD-603 625 DIV. 2

ELECTRON TUBES
MICROWAVE FREQUENCY
CALCULATION OF INTRA-PULSE PHASE SHIFT IN LINEAR

AD-603 907 DIV. 15
SOLUTIONS OF CONVEX GAMES AS FIXED-POINTS,
AD-603 996 DIV. 15

GAME THEORY
COUNTERMEASURES
TOTAL RECONNAISSANCE WITH TOTAL COUNTERMEASURES: SIMPLIFIED MODEL,
AD-603 838 DIV. 15

GAME THEORY
DECISION MAKING
TWO-PERSON GAMES INVOLVING BLUFFING,
AD-603 826 DIV. 15
PREFERENCE EXPERIMENTS,
AD-603 998 DIV. 28
THE INFLUENCE OF ENVIRONMENTAL NON-STATIONARITY IN A SEQUENTIAL DECISION-MAKING EXPERIMENT,
AD-604 154 DIV. 28
BEHAVIORAL MODEL OF RATIONAL CHOICE,
AD-604 198 DIV. 15

GAME THEORY
DIFFERENTIAL EQUATIONS
SOLUTIONS OF GAMES BY DIFFERENTIAL EQUATIONS,
AD-603 877 DIV. 15

GAME THEORY
ECONOMICS
A COMPARISON OF TREATMENTS OF A DUOPOLY SITUATION,
AD-603 925 DIV. 32
CONFLICTS WITH IMPRECISE PAYOFFS IN GAME THEORY,
AD-604 141 DIV. 15

GAME THEORY
EQUATIONS
CONTINUOUS GOLD-MINING EQUATION,
AD-604 239 DIV. 15

GAME THEORY
FUNCTIONAL ANALYSIS
ANALYSIS OF THREE-MOVE FINITE GAMES,
AD-603 990 DIV. 15

GAME THEORY
FUNCTIONS
GAMES WITH CONTINUOUS, CONVEX PAY-OFF,
AD-603 820 DIV. 15
TWO PERSON COOPERATIVE GAMES,
AD-603 889 DIV. 15
SADDLE-POINT SOLUTION TO A ZERO-SUM TWO-PERSON GAME OVER FUCTION SPACE,
AD-603 983 DIV. 15
CLASS OF GAMES DESCRIBING THE NATURE OF OPTIMAL STRATEGIES FOR A PAY OFF KERNEL,
AD-603 995 DIV. 15

GAME THEORY
GROUP DYNAMICS
PREFERENCE EXPERIMENT,
AD-604 002 DIV. 28

GAME THEORY
INTEGRAL EQUATIONS
REDUCTION OF CERTAIN CLASSES OF GAMES TO INTEGRAL EQUATIONS,
AD-603 988 DIV. 15

GAME THEORY
ITERATIVE METHODS
AN ITERATIVE METHOD OF SOLVING A GAME,
AD-603 881 DIV. 15
EXTENSION OF THE BROWN-ROBINS ON ITERATIVE PROCESS FOR FINDING THE VALUE OF A GAME,
AD-604 082 DIV. 15
ON A NEW ITERATIVE ALGORITHM FOR FINDING THE SOLUTIONS OF GAMES AND LINEAR PROGRAMMING PROBLEMS,
AD-604 295 DIV. 15

GAME THEORY
LEARNING
GAME-LEARNING THEORY AND DECISION-MAKING EXPERIMENTS,
AD-604 157 DIV. 28

GAME THEORY
LOGISTICS
EXAMPLE IN THE THEORY OF ORGANIZATION,
AD-604 080 DIV. 18

GAME THEORY
MAPPING (TRANSFORMATIONS)
ISOMORPHISM OF GAMES, AND STRATEGIC EQUIVALENCE,
AD-603 809 DIV. 15

GAME THEORY
MATHEMATICAL ANALYSIS
THEORY OF INFINITE GAMES,
AD-603 993 DIV. 15
VALUE FOR N-PERSON GAMES,
AD-604 084 DIV. 15
QUOTA SOLUTIONS OF N-PERSON GAMES,
AD-604 085 DIV. 15
MULTIDIMENSIONAL UTILITIES,
AD-604 151 DIV. 15
DERIVATIVE TEST FOR FINITE SOLUTION OF GAMES,
AD-604 205 DIV. 15

GAME THEORY
MATHEMATICS
SOCIAL EQUILIBRIUM THEOREM,
AD-604 129 DIV. 15
NEW CURRENTS IN MATHEMATICS,
AD-604 132 DIV. 15

GAME THEORY
MATRIX ALGEBRA
SOLUTIONS OF DISCRETE, TWO-PERSON GAMES,
AD-603 812 DIV. 15
SOME NOTES ON COMPUTATION OF GAMES SOLUTIONS,
AD-603 823 DIV. 15
METHODS OF SOLUTION IN GAME THEORY,
AD-603 837 DIV. 15

GAME THEORY
OPTIMIZATION
ON CERTAIN GAMES WITH TRANSCENDENTAL VALUES,
AD-603 896 DIV. 15
COMMENTS ON J. VON NEUMANN'S 'THE PROBLEM OF OPTIMAL ASSIGNMENT IN A TWO-PERSON GAME,'
AD-604 238 DIV. 15
COMMENTS ON J. VON NEUMANN'S 'THE PROBLEM OF OPTIMAL ASSIGNMENT IN A TWO-PERSON GAME',
AD-604 238 DIV. 15

GAME THEORY
POLYNOMIALS
POLYNOMIAL GAMES: THEORY OF TWO-PERSON ZERO-SUM GAMES IN WHICH THE PAYOFF IS A POLYNOMIAL FUNCTION,
AD-603 834 DIV. 15

GAME THEORY
TIME
GAMES OF TIMING,
AD-603 874 DIV. 15

GAMMA RAYS
ATTENUATION
ATTENUATION OF GAMMA RAYS, I. TRANSMISSION VALUES FOR FINITE SLABS OF LEAD, IRON, AND THE COMPTON SCATTERER,
AD-604 199 DIV. 25
ATTENUATION OF GAMMA RAYS, II. TRANSMISSION VALUES FOR VARIOUS MATERIALS AND GEOMETRIES,
AD-604 200 DIV. 25

GAMMA RAYS
NUCLEAR SCATTERING
SCATTERING AND ABSORPTION OF GAMMA RAYS,
AD-603 883 DIV. 20

GAMMA RAYS
RADIATION MEASUREMENT SYSTEMS
GAMMA RADIATION DOSE RATE DISTRIBUTION IN A COMPARTMENTED STEEL STRUCTURE,
AD-604 192 DIV. 13

GAMMA RAYS
WAVE TRANSMISSION
GAMMA-RAY TRANSMISSION,
AD-603 878 DIV. 20

GAS DETECTORS
INFRARED EQUIPMENT
DESIGN AND CONSTRUCTION OF SPIRT (SHORT PATH INFRARED) INSTRUMENTATION,
AD-604 110 DIV. 3

GAS DISCHARGES
VAPORS
PROPERTIES OF HIGH CURRENT, LOW FREQUENCY ELECTRODELESS DISCHARGES EXCITED IN CESIUM, RUBIDIUM, POTASSIUM, AND MERCURY VAPORS,
AD-603 935 DIV. 25

GAS FLOW
MAGNETIC FIELDS
SIMILARITY RULES OF THE FLOW OF A PERFECTLY CONDUCTING GAS WITH AN ALIGNED MAGNETIC FIELD,
AD-603 621 DIV. 9

GAS FLOW
OPTICAL ANALYSIS
BOUNDARY LAYER AND SHOCK WAVE INTERACTIONS OBSERVED ALONG PROBES AND WIRES IN SUPERSONIC AIR STREAMS,
AD-604 111 DIV. 9
INTERFEROMETRIC STUDY OF A SUPERSONIC AIR JET AT 60 LB/SQ IN TANK PRESSURE,
AD-604 112 DIV. 9

GAS FLOW
TEXTBOOKS
INTRODUCTION TO TWO-PHASE GAS-LIQUID FLOW,
AD-603 659 DIV. 9

GAS TURBINES
DUST
DUST CONCENTRATION MEASUREMENT ON THE U. S. ARMY OVERLAND TRAIN MARK II,
AD-604 027 DIV. 11

GASOLINE
MIXTURES
CONCAVE PROGRAMMING FOR GASOLINE BLENDS,
AD-604 208 DIV. 10

GATES (CIRCUITS)
SWITCHING CIRCUITS
ANALYSIS AND SYNTHESIS OF SWITCHING NETWORKS COMPOSED OF N-OUT-OF-N DECISION GATES,
AD-604 043 DIV. 7

GEARS
HELICOPTERS
STUDY OF HELICOPTER GEAR LUBRICATION,
AD-603 960 DIV. 1

GENERATORS
DESIGN
TRANSLATION OF RUSSIAN RESEARCH: CONTACTLESS SINGLE-PHASE SYNCHRONOUS GENERATORS,
AD-603 664 DIV. 7

GEOGRAPHY
COMMERCE
SOVIET CONCEPT OF ECONOMIC REGIONALIZATION,
AD-604 003 DIV. 32

GEOMETRY
CONVEX SETS
GEOMETRY OF MOMENT SPACES,
AD-603 980 DIV. 15

GEOMETRY
OPTICS
GEOMETRIC STUDY OF COHERENCE PROPERTIES OF PARTIALLY POLARIZED ELECTROMAGNETIC RADIATION,
AD-603 588 DIV. 25

GERMANIUM COMPOUNDS
METALLORGANIC COMPOUNDS
GERMANIUM MACROCYCLIC COMPLEXES BASED ON PHTHALOCYANINE AND HEMIPORPHYRAZINE
AD-604 117 DIV. 4

GLASS
FILAMENT WOUND CONSTRUCTION
HYDROSTATIC TEST PROCEDURES ON GLASS-FILAMENT-WOUND CHAMBERS,
AD-604 104 DIV. 14

GLIDE PATH SYSTEMS
INSTRUMENT LANDINGS
ANALOG COMPUTER STUDY OF SAFE LOW APPROACH DECISION REGIONS AND EFFECTIVENESS OF GLIDE PATH EXTENSION TECHNIQUES,
AD-603 869 DIV. 1

GLOVES
PRESSURE SUITS
FINGER DEXTERITY OF THE PRESSURE-SUITED SUBJECT,
AD-603 705 DIV. 16

GLOW DISCHARGES
SPECTROSCOPY
RESONANT ENERGY TRANSFER FROM MERCURY TO ZINC IN RELATION TO A GAS LASER,
AD-603 680 DIV. 25

GLYCOPROTEINS
CHEMICAL BONDS
DISTRIBUTION AND COMPOSITION OF SIALIC ACIDS AND GLYCOPROTEINS,
AD-603 717 DIV. 16

GOVERNMENT EMPLOYEES
GOVERNMENT (FOREIGN)
POLITICAL VIEWS OF THE GERMAN CIVIL SERVICE,
AD-604 326 DIV. 32

GOVERNMENT PROCUREMENT
WEAPONS
A REVIEW OF THE WEAPONS ACQUISITION PROCESS: ECONOMIC INCENTIVES,
AD-603 973 DIV. 18

GOVERNMENT (FOREIGN)
POLITICAL SCIENCE
GERMAN GEOPOLITICS REVIVED,
AD-604 311 DIV. 32

GRAPHICS
CURVE FITTING
INCOMPLETE APPROXIMATOR (IN SIX FITS): CURVE FITTING TECHNIQUES,
AD-604 216 DIV. 15

GRAPHICS
NETWORKS
PRINCIPLES OF UNISTOR GRAPHS: APPLICATION TO COMMUNICATION NETWORKS,
AD-604 095 DIV. 5

FLUID FLOW
SOUND TRANSMISSION
TRANSMISSION OF SOUND IN A MOVING FLUID,
AD-604 123 DIV. 25

FLUID FLOW
STABILITY
STABILITY OF FLUID FLOWS WITH SPHERICAL SYMMETRY,
AD-604 213 DIV. 9

FLUID FLOW
TEXTBOOKS
INTRODUCTION TO TWO-PHASE GAS-LIQUID FLOW,
AD-603 659 DIV. 9

FLUID FLOW
TURBULENCE
KOLMOGOROV'S HYPOTHESES AND EULERIAN TURBULENCE THEORY,
AD-603 628 DIV. 9
LAGRANGIAN-HISTORY CLOSURE APPROXIMATION FOR TURBULENCE,
AD-603 629 DIV. 9

FLUORESCENCE
SILANES
LUMINESCENT PROPERTIES OF MIXED PHENYL-AND BIPHENYL SILANES,
AD-603 615 DIV. 4

FLUORIDES
INFRARED SPECTROSCOPY
FAR INFRARED SPECTRUM OF HYDROGEN FLUORIDE,
AD-604 168 DIV. 25

FLUORINE COMPOUNDS
HALOGENATED HYDROCARBONS
TEMPERATURE DEPENDENCE OF THE F-F COUPLING CONSTANTS IN 2-FLUOROBENZOTRIFLUORIDES,
AD-603 636 DIV. 4
INFRARED SPECTRA OF PERFLUOROCYCLOPROPANE AND CIS-AND TRANS-PERFLUOROBUTENE-2,
AD-604 051 DIV. 4
PREPARATION, PURIFICATION, AND INFRARED SPECTRA OF DIFLUORO ACETYLENE,
AD-604 104 DIV. 4

FLUTTER
AIRPLANE PANELS
TRANSTABILITY FLUTTER OF SUPERSONIC AIRCRAFT PANELS,
AD-603 835 DIV. 1

FLUTTER
CAVITATION
CRITICAL RE-EVALUATION OF HYDRODYNAMIC THEORIES AND EXPERIMENTS IN SUBCAVITATING HYDROFOIL FLUTTER,
AD-603 750 DIV. 9
CORRELATION OF VARIOUS SUBCAVITATING HYDROFOIL FLUTTER PREDICTIONS USING MODIFIED OSCILLATORY LIFT AND MOMENT COEFFICIENTS,
AD-603 754 DIV. 9

FLUTTER
FREQUENCY
FREQUENCY EFFECTS IN PANEL FLUTTER OF CYLINDRICAL SHELLS,
AD-603 961 DIV. 9

FOAMS
VIBRATION ISOLATORS
RESPONSE OF FOAM-ISOLATED TUNNEL LININGS TO TRANSIENT LOADINGS,
AD-603 539 DIV. 13

FOILS
REFLECTORS
EXPLORATORY PREPARATION OF FOILS STRONGLY COLORED IN THE 1 -6 MICRON REGION OF THE INFRARED,
AD-604 009 DIV. 14

FOOD POISONING
MICROORGANISMS
A STUDY OF CHARACTERISTICS AND METHODS OF DETECTION OF FOOD POISONING MICROORGANISMS WITH PARTICULAR EMPHASIS ON CLOSTRIDIUM PERFRINGENS,
AD-604 188 DIV. 16

FORCE (MECHANICS)
MEASUREMENT
ANALYSIS OF FORCE MEASUREMENT ON A WATER TUNNEL FOUR-COMPONENT BALANCE,
AD-603 748 DIV. 30

FOREIGN GOVERNMENT
USSR
POLITBURO IMAGES OF STALIN,
AD-603 888 DIV. 32

FOREIGN POLICY
ATTITUDES
POLITICAL VIEWS OF THE GERMAN CIVIL SERVICE,
AD-604 326 DIV. 32

FOREIGN POLICY
CHINA
COMMUNIST REACH FOR EMPIRE,
AD-603 671 DIV. 18

FOREIGN POLICY
LIMITED WAR
U. S. REACTION TO NORTH KOREAN AGGRESSION,
AD-604 322 DIV. 18

FOREIGN POLICY
PSYCHOLOGICAL WARFARE
PSYCHOLOGICAL WARFARE RECONSIDERED,
AD-603 909 DIV. 18

FOREIGN POLICY
WEST GERMANY
GERMAN REARMAMENT AND THE OLD MILITARY ELITE,
AD-604 284 DIV. 32

FORGING
TANTALUM ALLOYS
PILOT PRODUCTION AND EVALUATION OF TANTALUM ALLOY SHEET,
AD-604 173 DIV. 17

FOURIER ANALYSIS
REVIEWS
REVIEW OF FOURIER ANALYSIS AND AUTOCORRELATION,
AD-604 323 DIV. 15

FRACTOGRAPHY
DICTIONARIES
ILLUSTRATED GLOSSARY OF FRACTOGRAPHIC TERMS: SECTION 21 GLIDE PLANE DECOHESION, SERPENTINE GLIDE, RIPPLES, STRETCHING, MICROVOID COALESCENCE,
AD-603 777 DIV. 17

FRACTURE (MECHANICS)
ALLOYS
EFFECT OF CRACK SHAPE ON FRACTURE TOUGHNESS OF MARAGING STEELS, TEMPERED STEEL AND TITANIUM ALLOYS,
AD-604 056 DIV. 17

FRACTURE (MECHANICS)
METALLIC CRYSTALS
ILLUSTRATED GLOSSARY OF FRACTOGRAPHIC TERMS: SECTION 21 GLIDE PLANE DECOHESION, SERPENTINE GLIDE, RIPPLES, STRETCHING, MICROVOID COALESCENCE,
AD-603 777 DIV. 17

FRACTURE (MECHANICS)
MOLYBDENUM
TENSILE DUCTILITY-TRANSITION IN MOLYBDENUM,
AD-603 698 DIV. 17

FRACTURE (MECHANICS)
SHEETS
SINGLE EDGE CRACKS IN RECTANGULAR TENSILE SHEET,
AD-603 855 DIV. 25

FREE RADICALS
CHEMICAL REACTIONS
OBSERVATION AND KINETIC INVESTIGATION OF THE NF AND NF2 RADICALS,
AD-603 653 DIV. 4

FREE RADICALS
REACTION KINETICS
HIGH INTENSITY PHOTOLYSIS OF AZO COMPOUNDS AT 3600 A,
AD-603 679 DIV. 4

FREQUENCY CONVERTERS
DESIGN
FREQUENCY CONVERTER UNITS FOR L-BAND, S-BAND, C-BAND, AND X-BAND,
AD-603 765 DIV. 8

FRICTION
AIRCRAFT TIRES
COMPROMISES ESSENTIAL TO SELECTION OF AN AIRCRAFT TIRE TREAD DESIGN,
AD-603 700 DIV. 1

FUEL ADDITIVES
CORROSION INHIBITION
A STUDY OF EXISTING BASE FUEL HANDLING PROCEDURES IN RELATION TO MICROBIAL CONTAMINATION,
AD-603 852 DIV. 10

FUEL CELLS
DESIGN
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL,
AD-604 114 DIV. 7

FUEL CELLS
ELECTRODES
STUDY OF HYDROGEN-OXYGEN FUEL CELL ELECTRODES,
AD-603 430 DIV. 7
KINETIC STUDIES OF THE HYDROGEN ELECTRODE WITH THE ROTATING DISK TECHNIQUE,
AD-604 268 DIV. 4

FUEL CONTAMINATION
HANDLING
A STUDY OF EXISTING BASE FUEL HANDLING PROCEDURES IN RELATION TO MICROBIAL CONTAMINATION,
AD-603 852 DIV. 10

FUEL CONTAMINATION
ION ENGINES
EFFECT OF IMPURITIES OF CESIUM FUEL UPON ION ENGINES,
AD-603 631 DIV. 10

FUNCTIONS
CONTROL SYSTEMS
EVALUATION OF SELECTED DESCRIBING FUNCTIONS OF CONTROL SYSTEM NONLINEARITIES
AD-603 957 DIV. 7

FUNCTIONS
EQUATIONS
COMPUTATIONAL PROBLEMS IN THE THEORY OF DYNAMIC PROGRAMMING,
AD-604 231 DIV. 15
FUNCTIONAL EQUATION IN THE THEORY OF DYNAMIC PROGRAMMING AND ITS GENERALIZATIONS,
AD-604 236 DIV. 15

FUNCTIONS
GAME THEORY
GAMES WITH CONTINUOUS, CONVEX PAY-OFF,
AD-603 820 DIV. 15

FUNCTIONS
INEQUALITIES
INEQUALITY FOR CONVEX FUNCTIONS INVOLVING MAJORIZATION
AD-604 251 DIV. 15

FUNCTIONS
MATHEMATICAL LOGIC
STRUCTURAL ANALYSIS OF MANY VALUED LOGIC,
AD-604 045 DIV. 15

FUNCTIONS
NUMERICAL ANALYSIS
ANALYTICAL APPROXIMATIONS OF HIGHER MATHEMATICAL FUNCTIONS,
AD-604 128 DIV. 15
POLYNOMIAL-LIKE APPROXIMATION,
AD-604 142 DIV. 15
ANALYTICAL APPROXIMATIONS OF HIGHER MATHEMATICAL FUNCTIONS,
AD-604 147 DIV. 15
ANALYTICAL APPROXIMATIONS OF PROBABILITY FUNCTIONS AND BESSEL FUNCTIONS,
AD-604 154 DIV. 15
ANALYTICAL APPROXIMATIONS OF PROBABILITY FUNCTIONS AND BESSEL FUNCTIONS,
AD-604 158 DIV. 15
APPROXIMATIONS IN NUMERICAL ANALYSIS: CHOICE OF PARAMETRIC FORM,
AD-604 232 DIV. 15

FUNCTIONS
THEOREMS
SOME APPLICATIONS OF A THEOREM ON CONVEX FUNCTIONS,
AD-603 822 DIV. 15

FUSELAGES
DESIGN
DESIGN OF CONSTANT-VOLUME MISSILE FUSELAGES HAVING MINIMUM DRAG AT SUPERSONIC SPEEDS,
AD-603 802 DIV. 12

GALLIUM ALLOYS
ARSENIC ALLOYS
SURFACE STATES ON HIGH-RESISTIVITY GALLIUM ARSENIDE,
AD-603 751 DIV. 8
SURFACE FIELD EFFECT TRANSISTORS BASED ON HIGH-RESISTIVITY GALLIUM ARSENIDE,
AD-603 752 DIV. 8
INTEGRATED BANDPASS AMPLIFIERS BASED ON HIGH-RESISTANCE GALLIUM ARSENIDE TRANSISTORS,
AD-603 753 DIV. 8

GALLIUM COMPOUNDS
ARSENIDES
PRODUCTION ENGINEERING MEASURE FOR GALLIUM ARSENIDE VARACTOR DIODE,
AD-604 050 DIV. 8

GALVANIC SKIN RESPONSE
CONDITIONED REFLEX
RE-ANALYSIS OF GSR CONDITIONING
AD-603 576 DIV. 16

GALVANIC SKIN RESPONSE
TEST EQUIPMENT
AN ASSESSMENT OF LIE DETECTION CAPABILITY (DECLASSIFIED VERSION),
AD-603 860 DIV. 30

GAME THEORY
CALCULUS OF VARIATIONS
CLASS OF GAMES OVER FUNCTION SPACE AND RELATED VARIATIONAL PROBLEMS,
AD-604 217 DIV. 15

GAME THEORY
CONVEX SETS
THEOREM OF VILLE,
AD-603 827 DIV. 15
A FURTHER GENERALIZATION OF THE KAKUTANI FIXED POINT THEOREM, WITH APPLICATION TO NASH EQUILIBRIUM POINTS,

FLOW OSCILLATIONS: PRELIMINARY SURVEY,
AD-603 652 DIV. 9

HYDROFOILS
HYDRODYNAMICS
CRITICAL RE-EVALUATION OF HYDRODYNAMIC THEORIES AND EXPERIMENTS IN SUBCAVITATING HYDROFOIL FLUTTER,
AD-603 750 DIV. 9
CORRELATION OF VARIOUS SUBCAVITATING HYDROFOIL FLUTTER PREDICTIONS USING MODIFIED OSCILLATORY LIFT AND MOMENT COEFFICIENTS,
AD-603 754 DIV. 9

HYDROFOILS
JET FLAPS
USE OF JET-FLAPPED HYDROFOILS AS SHIP ANTIPITCHING FINS,
AD-604 011 DIV. 31

HYDROGEN
ATOMIC PROPERTIES
RENTZEL, KRAMERS, BRILLOUIN APPROXIMATION THROUGH THE TURNING POINT,
AD-604 303 DIV. 25

HYDROGEN
ELECTROCHEMISTRY
KINETIC STUDIES OF THE HYDROGEN ELECTRODE WITH THE ROTATING DISK TECHNIQUE,
AD-604 268 DIV. 4

HYDROGEN
FUEL CELLS
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL,
AD-604 114 DIV. 7

HYDROGEN
MOLECULAR SPECTROSCOPY
COHERENT INFRARED LASER: HYDROGEN SPECTROSCOPY,
AD-603 658 DIV. 25

HYDROGEN COMPOUNDS
INFRARED SPECTROSCOPY
FAR INFRARED SPECTRUM OF HYDROGEN FLUORIDE,
AD-604 168 DIV. 25

HYDROSTATIC PRESSURE
TEST METHODS
HYDROSTATIC TEST PROCEDURES ON GLASS-FILAMENT-WOUND CHAMBERS,
AD-604 104 DIV. 14

HYPERBOLIC NAVIGATION
RADIO NAVIGATION
OMEGA, A WORLD-WIDE NAVIGATIONAL SYSTEM, SYSTEM SPECIFICATION AND IMPLEMENTATION,
AD-603 764 DIV. 19

HYPERSONIC FLIGHT
ABLATION
DECELERATION AND MASS CHANGE OF AN ABLATING BODY DURING HIGH-VELOCITY MOTION IN THE ATMOSPHERE,
AD-604 038 DIV. 25

HYPERSONIC FLOW
BODIES OF REVOLUTION
LIFT ON INCLINED BODIES OF REVOLUTION IN HYPERSONIC FLOW,
AD-603 829 DIV. 9

HYPERSONIC FLOW
NITROGEN
AERODYNAMIC DRAG ON SPIKED BLUNT BODIES IN LOW-DENSITY HYPERSONIC FLOW,
AD-603 567 DIV. 9

HYPOTENSION
BLOOD VOLUME
PHYSIOLOGY OF PROLONGED OLIGEMIC HYPOTENSION,
AD-603 648 DIV. 16

ICE
CABLES
TRANSLATION OF RUSSIAN RESEARCH: GLAZED FROST AND ICE FORMATION ON CABLES WITHIN THE TERRITORY OF THE USSR,
AD-603 535 DIV. 2

IDENTIFICATION
TIME
THE PROBLEM OF IDENTIFICATION OF DISCRETE-TIME PROCESSES,
AD-603 739 DIV. 15

IMAGE INTENSIFIERS (ELECTRONICS)
SEMICONDUCTOR DEVICES
APPLICATION OF LIGHT AND IMAGE INTENSIFICATION,
AD-603 526 DIV. 25

IMMUNOLOGY
CELLS (BIOLOGY)
CULTIVATION OF DIPLOID CELL STRAIN WI-38, AND ANTIGENIC CHANGES IN THYROID CELLS,
AD-604 179 DIV. 16

IMPURITIES
SEMICONDUCTORS
ACOUSTIC AMPLIFICATION AND ELECTRON MOBILITY IN LITHIUM AND SODIUM DOPED CADMIUM SULFIDE,
AD-603 611 DIV. 25

INDEXES
RADIATION DAMAGE
COORDINATE INDEX FOR MONTHLY ACCESSION LISTS FROM 1 OCT 63 TO 31 JUL 64 ON RADIATION DAMAGE,
AD-603 690 DIV. 14

INDUSTRIAL PRODUCTION
CONTROL SYSTEMS
EFFICIENT ALLOCATION OF RESOURCES,
AD-604 062 DIV. 32

INDUSTRIAL PRODUCTION
DYNAMIC PROGRAMMING
BOTTLENECK PROBLEMS AND DYNAMIC PROGRAMMING,
AD-604 219 DIV. 15
BOTTLENECK PROBLEMS, FUNCTIONAL EQUATIONS AND DYNAMIC PROGRAMMING,
AD-604 300 DIV. 15
THEORY OF DYNAMIC PROGRAMMING AS APPLIED TO A SMOOTHING PROBLEM,
AD-604 305 DIV. 15

INDUSTRIAL PRODUCTION
MATHEMATICAL MODELS
ACTIVITY ANALYSIS OF TECHNOLOGICAL STRUCTURES IN PRODUCTION: AN EXAMPLE,
AD-604 150 DIV. 32

INDUSTRIAL PRODUCTION
MATHEMATICAL PREDICTION
SPECIFIC INDUSTRY OUTPUT PROJECTIONS,
AD-603 916 DIV. 26
COMMENTS ON M. J. BARNETT'S 'SPECIFIC INDUSTRY OUTPUT PROJECTIONS,'
AD-603 989 DIV. 26

INDUSTRIAL PRODUCTION
QUALITY CONTROL
SAMPLING INSPECTION PLANS FOR CONTINUOUS PRODUCTION,
AD-603 801 DIV. 26

INDUSTRIAL PRODUCTION
STATISTICAL ANALYSIS
COMPARISONS OF INPUT-OUTPUT AND ALTERNATIVE PROJECTIONS,
AD-603 987 DIV. 26

INDUSTRIAL PRODUCTION
USSR
RUSSIAN LABOR PRODUCTIVITY STATISTICS,
AD-603 845 DIV. 32
TRENDS IN SOVIET INDUSTRIAL PRODUCTIVITY,
AD-604 073 DIV. 26

INDUSTRIAL RELATIONS
DECISION MAKING
FORMAL THEORY OF THE EMPLOYMENT RELATIONSHIP,
AD-603 913 DIV. 23

INDUSTRIAL TRAINING
EUROPE
REPORT OF A STUDY TOUR OF EUROPEAN INDUSTRIAL THERAPY PROGRAMS WITH SPECIAL REFERENCE TO THE REHABILITATION OF OLDER PEOPLE,
AD-603 646 DIV. 23

INDUSTRIES
DISTRIBUTION (ECONOMICS)
EFFICIENCY ASPECTS OF DISPERSAL OF POPULATION AND INDUSTRY,
AD-603 921 DIV. 18

INEQUALITIES
BOUNDS ON DENSITIES AND HAZARD RATES,
AD-603 538 DIV. 15

INEQUALITIES
FUNCTIONS
INEQUALITY FOR CONVEX FUNCTIONS INVOLVING MAJORIZATION
AD-604 251 DIV. 15

INEQUALITIES
LINEAR SYSTEMS
NOTES ON THE SOLUTION OF LINEAR SYSTEMS INVOLVING INEQUALITIES,
AD-603 824 DIV. 15

INEQUALITIES
MATHEMATICAL ANALYSIS
NOTES ON MATRIX THEORY: AN INEQUALITY DUE TO BERGSTROM,
AD-604 293 DIV. 15

INEQUALITIES
THEOREMS
INEQUALITIES: AN ELEMENTARY PRESENTATION,
AD-604 221 DIV. 15

INEQUALITIES
THEORY
DRESHER'S INEQUALITY,
AD-603 918 DIV. 15

INERTIAL NAVIGATION
DYNAMICS
THEORY OF BLIND NAVIGATION BY DYNAMICAL MEASUREMENTS,
AD-603 844 DIV. 19

INERTIAL NAVIGATION
FEASIBILITY STUDIES
FEASIBILITY STUDIES OF A VELOCITY-DAMPED INERTIAL NAVIGATION SYSTEM,
AD-603 939 DIV. 19

INFORMATION RETRIEVAL
DIGITAL COMPUTERS
FACT CORRELATION AS A MEANS OF TEXT REORGANIZATION FOR INFORMATION RETRIEVAL,
AD-603 697 DIV. 30

INFRARED DETECTORS
GUIDED MISSILE DETECTION
AIRBORNE SYSTEM FOR THE MEASUREMENT OF INFRARED MISSILE SPECTRA,
AD-603 541 DIV. 6

INFRARED DETECTORS
TESTS
PRODUCTION ENGINEERING MEASURE FOR IN-200 PBSE INFRARED DETECTORS,
AD-604 186 DIV. 6

INFRARED EQUIPMENT
GAS DETECTORS
DESIGN AND CONSTRUCTION OF SPIRT (SHORT PATH INFRARED) INSTRUMENTATION,
AD-604 110 DIV. 3

INFRARED EQUIPMENT
INDUSTRIAL PRODUCTION
TRANSLATION OF CZECHOSLOVAKIAN RESEARCH, ALL UNION CONFERENCE ON THE TECHNIQUE OF INFRARED RADIATION AND ITS UTILIZATION IN SCIENCE AND INDUSTRY,
AD-603 948 DIV. 25

INFRARED RADIATION
REFLECTION
EXPLORATORY PREPARATION OF FOILS STRONGLY COLORED IN THE 1 -4 MICRON REGION OF THE INFRARED,
AD-604 009 DIV. 14

INFRARED RADIATION
SCATTERING
EXPERIMENTAL STUDY OF INFRARED SCATTERING BY CLOUDS OF PARTICLES,
AD-603 851 DIV. 25

INFRARED RADIATION
SCIENTIFIC RESEARCH
TRANSLATION OF CZECHOSLOVAKIAN RESEARCH, ALL UNION CONFERENCE ON THE TECHNIQUE OF INFRARED RADIATION AND ITS UTILIZATION IN SCIENCE AND INDUSTRY,
AD-603 948 DIV. 25

INFRARED SPECTROSCOPY
LINE SPECTRUM
MEASUREMENT OF PRESSURE INDUCED SHIFTS OF ABSORPTION LINES IN THE INFRARED SPECTRUM,
AD-603 937 DIV. 25

INPUT-OUTPUT DEVICES
SPECIFICATIONS
NUMBER OF CENTRAL CELLS TO MEET ALL INPUT-OUTPUT SPECIFICATIONS FOR MEMORYLESS ROBOTS,
AD-604 137 DIV. 30

INSTRUMENT LANDINGS
GLIDE PATH SYSTEMS
ANALOG COMPUTER STUDY OF SAFE LOW APPROACH DECISION REGIONS AND EFFECTIVENESS OF GLIDE PATH EXTENSION TECHNIQUES,
AD-603 869 DIV. 1

INSTRUMENT PANELS
JET TRANSPORT PLANES
ANALYSIS OF CONTROL-DISPLAY LIMITATIONS IN MULTI-JET TRANSPORT AIRCRAFT,
AD-604 065 DIV. 1

INTEGRAL EQUATIONS
FUNCTIONS
SOLUTIONS OF INTEGRAL EQUATIONS RELATED TO THE BESSEL AND MATHIEU FUNCTIONS,
AD-603 982 DIV. 15

INTEGRAL EQUATIONS
GAME THEORY
REDUCTION OF CERTAIN CLASSES OF GAMES TO INTEGRAL EQUATIONS,
AD-603 988 DIV. 15

INTEGRAL EQUATIONS
MATHEMATICS
A CLASS OF INTEGRAL EQUATIONS
AD-603 873 DIV. 15

INTEGRAL EQUATIONS
NEUTRON TRANSPORT THEORY
THEORETICAL CALCULATION OF NEUTRON AGE,
AD-603 603 DIV. 0

GRAVITY
MECHANICAL WAVES
THIRD ORDER STEADY STATE SOLUTIONS FOR INTERSECTING TRAINS OF GRAVITY WAVES,
AD-604 870 DIV. 2

GRAVITY (ARTIFICIAL)
FLIGHT PATHS
AN AUTOMATIC FLIGHT CONTROL SYSTEM TO SIMULATE SUB-EARTH GRAVITY ENVIRONMENTS IN THE KC-135 AIRCRAFT,
AD-603 932 DIV. 12

GREEN'S FUNCTION
DIFFERENTIAL EQUATIONS
NUMERICAL SOLUTION OF THE PERTURBED HARMONIC OSCILLATOR EQUATION AND THE HARTREE-FOCK MANY-ELECTRON EQUATIONS BY USE OF GREEN'S FUNCTION,
AD-603 607 DIV. 25

GROUND SUPPORT EQUIPMENT
RE-ENTRY VEHICLE SIMULATION DESIGNED FOR THE STUDY OF GROUND SYSTEM REQUIREMENTS,
AD-603 714 DIV. 12

GROUP DYNAMICS
ATTITUDES
PERSON PERCEPTION AMONG AMERICAN AND INDIAN STUDENTS AND CREATIVE PROBLEM SOLVING IN CULTURALLY HETEROGENEOUS GROUPS,
AD-603 945 DIV. 28

GROUP DYNAMICS
DECISION MAKING
PREFERENCE EXPERIMENTS,
AD-603 998 DIV. 28
PREFERENCE EXPERIMENT,
AD-604 002 DIV. 28

GROUP DYNAMICS
LEADERSHIP
EVALUATION OF A POPULAR LEADER,
AD-603 580 DIV. 28
SOME EFFECTS OF LEADERSHIP TRAINING ON INTERCULTURAL DISCUSSION GROUPS,
AD-603 946 DIV. 28

GROUP DYNAMICS
MATHEMATICS
PREFERENCE EXPERIMENTS,
AD-603 997 DIV. 28

GROUP DYNAMICS
PSYCHOMETRICS
SOCIAL INFLUENCE, INFORMATION PROCESSING, AND NET CONFORMITY IN DYADS,
AD-603 554 DIV. 28
PERCEPTION OF LEADERSHIP IN SMALL GROUPS: A RANK ORDER INVESTIGATION OF THE EMERGENCE OF THE LEADERSHIP ROLE IN SMALL GROUPS,
AD-603 793 DIV. 28

GUIDED MISSILE COMPONENTS
DRAG
DESIGN OF CONSTANT-VOLUME MISSILE FUSELAGES HAVING MINIMUM DRAG AT SUPERSONIC SPEEDS,
AD-603 802 DIV. 12

GUIDED MISSILE DETECTION
INFRARED DETECTORS
AIRBORNE SYSTEM FOR THE MEASUREMENT OF INFRARED MISSILE SPECTRA,
AD-603 541 DIV. 6

GUIDED MISSILE TARGETS
OPTIMIZATION
A MISSILE TARGETING PROBLEM,
AD-603 583 DIV. 12

GUIDED MISSILE TRACKING SYSTEMS
FEASIBILITY STUDIES
GUIDED MISSILE LIFT OFF MEASUREMENT SYSTEM UTILIZING NUCLEAR TRACKING,
AD-603 938 DIV. 6

GUIDED MISSILE TRAJECTORIES
OPTIMIZATION
VARIATIONAL PROBLEMS WITH STATE VARIABLE INEQUALITY CONSTRAINTS,
AD-603 722 DIV. 15

GUIDED MISSILES (AIR-TO-AIR)
LAUNCHING
ANALYSIS OF AN AIR-TO-AIR, AIR-TO-SURFACE MISSILE,
AD-603 975 DIV. 12

GUIDED MISSILES (AIR-TO-SURFACE)
LAUNCHING
ANALYSIS OF AN AIR-TO-AIR, AIR-TO-SURFACE MISSILE,
AD-603 975 DIV. 12

GUIDED MISSILES (SURFACE-TO-SURFACE)
CELESTIAL GUIDANCE
LUNAR PARALLAX METHOD OF ASTRO NAVIGATION,
AD-603 895 DIV. 19

GUN COMPONENTS
MOTION
DYNAMIC FORMULATION OF COEFFICIENT OF RESTITUTION IN MACHINE GUN COMPONENT COLLISIONS,
AD-603 711 DIV. 22

GUN COMPONENTS
STEEL
EXPERIMENTAL ELECTROMAGNETIC TEST METHODS FOR THE NONDESTRUCTIVE EVALUATION OF CARBURIZED STEEL PARTS,
AD-603 536 DIV. 26

HAFNIUM COMPOUNDS
HALIDES
THERMODYNAMIC FUNCTIONS OF HAFNIUM HALIDES,
AD-603 662 DIV. 4

HALOCARBON PLASTICS
PLASTIC COATINGS
DEVELOPMENT AND EVALUATION OF HEAT-RESISTANT, RAIN-EROSION -RESISTANT COATINGS,
AD-604 023 DIV. 14

HALOGENATED HYDROCARBONS
CHEMISTRY
PREPARATION, PURIFICATION, AND INFRARED SPECTRA OF DIFLUORO ACETYLENE,
AD-604 106 DIV. 4

HALOGENATED HYDROCARBONS
NUCLEAR SPINS
TEMPERATURE DEPENDENCE OF THE F-F COUPLING CONSTANTS IN 2-FLUOROBENZOTRIFLUORIDES,
AD-603 636 DIV. 4

HALOGENATED HYDROCARBONS
SPECTRA (INFRARED)
INFRARED SPECTRA OF PERFLUOROCYCLOPROPANE AND CIS-AND TRANS-PERFLUOROBUTENE-2,
AD-604 051 DIV. 4

HARBORS
HYDROLOGY
WAVE INDUCED OSCILLATIONS IN HARBORS; THE EFFECT OF THE VARIATION OF GEOMETRIC PARAMETERS ON THE RESPONSE OF RECTANGULAR HARBORS,
AD-603 971 DIV. 2

HARMONIC ANALYSIS
EQUATIONS
NON-LINEAR EQUATION OCCURRING IN THE HARMONIC ANALYSIS OF VISCOUS FLUID FLOW,
AD-603 891 DIV. 9

HARMONIC ANALYSIS
NONLINEAR DIFFERENTIAL EQUATIONS ON CERTAIN RELAXATION OSCILLATIONS; ASYMPTOTIC SOLUTIONS,
AD-603 687 DIV. 15
ON CERTAIN RELAXATION OSCILLATIONS; CONFINING REGIONS,
AD-603 688 DIV. 15

HARMONIC OSCILLATORS
QUANTUM MECHANICS
NUMERICAL SOLUTION OF THE PERTURBED HARMONIC OSCILLATOR EQUATION AND THE HARTREE-FOCK MANY-ELECTRON EQUATIONS BY USE OF GREEN'S FUNCTION,
AD-603 607 DIV. 25

HAZARDS
PROBABILITY
BOUNDS ON DENSITIES AND HAZARD RATES,
AD-603 538 DIV. 15

HEALTH PHYSICS
INSTRUCTION MANUALS
A PROTOTYPE CIVIL DEFENSE MANUAL FOR RADIOLOGICAL DECONTAMINATION OF MUNICIPALITIES, VOLUME I, DECONTAMINATION PLANNING,
AD-603 641 DIV. 18
PROTOTYPE CIVIL DEFENSE MANUAL FOR RADIOLOGICAL DECONTAMINATION OF MUNICIPALITIES, VOLUME II, DECONTAMINATION OPERATIONS,
AD-603 642 DIV. 18

HEAT
MATHEMATICAL ANALYSIS
TRANSLATION OF RUSSIAN RESEARCH; SIMILARITY THEORY AND ITS APPLICATION IN HEAT ENGINEERING,
AD-604 034 DIV. 25

HEAT EXCHANGERS
BERYLLIUM
LABORATORY AND FLIGHT EVALUATION OF AIRCRAFT AIRCOOLED WHEEL BRAKES WITH BERYLLIUM HEAT SINK,
AD-603 758 DIV. 1

HEAT TRANSFER
ROCKET IGNITERS
HEAT TRANSFER OF HOT NITROGEN IGNITION IN ROCKET IGNITERS,
AD-603 816 DIV. 10

HEATING
ELECTRON BOMBARDMENT
EFFECT OF ELECTRON BOMBARDMENT HEATING ON SURFACES OF TUNGSTEN,
AD-604 170 DIV. 17

HEAT-RESISTANT MATERIALS
DIELECTRICS
STUDIES ON THE FORMATION AND PROPERTIES OF HIGH-TEMPERATURE DIELECTRICS,
AD-603 899 DIV. 14

HEAT-RESISTANT MATERIALS
METAL-FORMING PRESSES
DEVELOPMENT OF IMPROVED LINER FOR EXTRUSION BILLET CONTAINERS,
AD-604 172 DIV. 26

HEAT-RESISTANT MATERIALS
PAINTS
DEVELOPMENT AND EVALUATION OF HEAT-RESISTANT, RAIN-EROSION -RESISTANT COATINGS,
AD-604 023 DIV. 14

HEAT-RESISTANT PLASTICS
VISCOELASTICITY
VISCOELASTIC PROPERTIES OF TWO HIGH-TEMPERATURE POLYMERS; H-FILM AND SP-POLYMER,
AD-604 010 DIV. 14

HELICOPTER ROTORS
DESIGN
INVESTIGATION OF ELASTIC COUPLING PHENOMENA OF HIGH SPEED RIGID ROTOR SYSTEMS,
AD-604 030 DIV. 1

HELICOPTERS
TRANSMISSION GEARS
STUDY OF HELICOPTER GEAR LUBRICATION,
AD-603 960 DIV. 1

HELIUM
PURIFICATION
TRANSLATION OF RUSSIAN RESEARCH; PHYSICAL BASIS OF SEPARATING HELIUM AND NITROGEN,
AD-603 976 DIV. 25

HELMETS
ACCELERATION TOLERANCE
EFFECTS OF VIBRATION ON DAL READING PERFORMANCE,
AD-603 963 DIV. 28

HEMORRHAGE
SHOCK (PATHOLOGY)
PHYSIOLOGY OF PROLONGED OLIGEMIC HYPOTENSION,
AD-603 648 DIV. 16

HIGH-TEMPERATURE RESEARCH
X-RAY DIFFRACTION ANALYSIS
RESEARCH IN HIGH-TEMPERATURE X-RAY DIFFRACTION TECHNOLOGY,
AD-603 584 DIV. 25

HISTORY
WARFARE
WAR AND PEACE,
AD-604 294 DIV. 32

HORIZON SCANNERS
SIMULATION
OPTIMAL LINEAR ESTIMATION FOR A HORIZON SCANNER USED FOR APPROXIMATING THE PITCH ATTITUDE OF AN ORBITING SPACECRAFT,
AD-604 180 DIV. 6

HOT WORKING
REFRACTORY METALS
HOT WORKING EVALUATION OF REFRACTORY AND REACTIVE METALS,
AD-603 779 DIV. 17

HOUSING
ECONOMICS
MODEL OF RESIDENTIAL LAND VALUES I,
AD-603 618 DIV. 32

HUMAN ENGINEERING
FLIGHT SIMULATORS
CONTACT ANALOG SIMULATOR EVALUATIONS: CLIMBOUT, LOW CRUISE AND DESCENT MANEUVERS,
AD-603 744 DIV. 1

HYDRAULIC FLUIDS
DECONTAMINATION
DECONTAMINATION OF HYDRAULIC FLUIDS BY HYDROCYCLONES,
AD-603 702 DIV. 14

HYDRAZONES
SYNTHESIS (CHEMISTRY)
SYNTHESIS OF CYCLOALKANONE ALKYLHYDRAZONES AND FACTORS INFLUENCING ISOMERIZATION TO CYCLOALKANE AZO ALKANES,
AD-603 684 DIV. 4

HYDRODYNAMICS
BOILER TUBES
TWO-PHASE GAS-LIQUID

BY DIFFRACTION GRATINGS,
AD-603 967 DIV. 25

LASERS
DESIGN
MATHEMATICAL ANALYSIS OF A REFLECTIVE TYPE LASER AMPLIFIER,
AD-604 100 DIV. 25

LASERS
DOPPLER SYSTEMS
INVESTIGATION OF OPTICAL DOPPLER SUBCARRIER REFLECTED SIGNAL LOSS ATTRIBUTED TO COHERENCE EFFECTS AT HIGH MODULATION FREQUENCIES,
AD-604 067 DIV. 19

LASERS
ELECTRONIC SWITCHES
LASER TRIGGERED SPARK GAP,
AD-603 613 DIV. 25

LASERS
GASES
RESONANT ENERGY TRANSFER FROM MERCURY TO ZINC IN RELATION TO A GAS LASER,
AD-603 680 DIV. 25

LASERS
INFRARED RADIATION
COHERENT INFRARED LASER: HYDROGEN SPECTROSCOPY,
AD-603 658 DIV. 25

LASERS
MATERIALS
LASER DEVICES EXPLORATORY INVESTIGATION,
AD-604 038 DIV. 25

LASERS
OSCILLATION
TRANSVERSE MODES OF RUBY LASERS STUDIED BY USE OF BEAT FREQUENCY DETECTION AND FAST PHOTOGRAPHY,
AD-603 594 DIV. 25

LASERS
OSCILLATORS
LIGHT MODULATION DETECTOR, STABILIZATION OF A LASER LOCAL OSCILLATOR,
AD-604 022 DIV. 8

LASERS
RUBY
MICROWAVE-OPTICAL EXPERIMENTS AND PSEUDO-STARK EFFECT IN RUBY,
AD-603 649 DIV. 25

LASERS
SCATTERING
THOMSON SCATTERING COMPUTATIONS FOR LABORATORY PLASMAS,
AD-603 930 DIV. 25
RESEARCH ON MANY ELEMENT LASERS,
AD-603 968 DIV. 25

LAUNCHING
GUIDED MISSILES
GUIDED MISSILE LIFT OFF MEASUREMENT SYSTEM UTILIZING NUCLEAR TRACKING,
AD-603 938 DIV. 6
ANALYSIS OF AN AIR-TO-AIR, AIR-TO-SURFACE MISSILE,
AD-603 975 DIV. 12

LEAD
IMPACT SHOCK
DYNAMIC STRESS-STRAIN RELATION OF METAL AS DETERMINED FROM IMPACT TESTS WITH A HARD BALL,
AD-603 929 DIV. 17

LEADERSHIP
PERCEPTION (PSYCHOLOGY)
PERCEPTION OF LEADERSHIP IN SMALL GROUPS: A RANK ORDER INVESTIGATION OF THE EMERGENCE OF THE LEADERSHIP ROLE IN SMALL GROUPS,
AD-603 793 DIV. 28

LEADERSHIP
SOCIOMETRICS
EVALUATION OF A POPULAR LEADER,
AD-603 580 DIV. 28

LEADERSHIP
TRAINING
SOME EFFECTS OF LEADERSHIP TRAINING ON INTERCULTURAL DISCUSSION GROUPS,
AD-603 996 DIV. 28

LEARNING
PERFORMANCE TESTS
GAME-LEARNING THEORY AND DECISION-MAKING EXPERIMENTS,
AD-604 157 DIV. 28
OPERATOR PERFORMANCE STUDIES: LEARNING ANALYSIS FROM THREE-PLANE MOTIONS,
AD-603 528 DIV. 28

LEARNING
STOCHASTIC PROCESSES
STOCHASTIC LEARNING THEORY,
AD-604 140 DIV. 13

LENSES
WAVEGUIDE COUPLERS
DESIGN AND OPERATION OF A RADIATING LENS FED BY A GOUBAU BEAM-WAVEGUIDE,
AD-603 552 DIV. 8

LIBYA
EARTHQUAKES
LIBYAN EARTHQUAKE OF FEBRUARY 21, 1963,
AD-603 695 DIV. 2

LIFE SPAN
PROBABILITY
LARGE SAMPLE TESTS AND CONFIDENCE INTERVALS FOR MORTALITY RATES,
AD-603 828 DIV. 15

LIFE SUPPORT
SPACE BIOLOGY
STUDY OF HYDROGEN-FIXING MICROORGANISMS FOR CLOSED REGENERATING BIOSYSTEMS,
AD-603 595 DIV. 16

LIFT
BODIES OF REVOLUTION
LIFT ON INCLINED BODIES OF REVOLUTION IN HYPERSONIC FLOW,
AD-603 829 DIV. 9
DIFFRACTION OF LIGHT BY SOUND,
AD-603 745 DIV. 25

LIGHT
INTENSITY
APPLICATION OF LIGHT AND IMAGE INTENSIFICATION,
AD-603 526 DIV. 25

LIGHT COMMUNICATION SYSTEMS
MODULATION
HETERODYNE DETECTION IN OPTICAL COMMUNICATION,
AD-603 622 DIV. 5

LIGHT SIGNALS
SCATTERING
CORRELATION BETWEEN ATMOSPHERIC BACK-SCATTERING AND METEOROLOGICAL VISUAL RANGE,
AD-604 253 DIV. 2

LIGHTING EQUIPMENT
RUNWAYS
SIMULATOR COMPARISON OF NETHERLANDS LANDING ZONE LIGHTING PATTERNS,
AD-603 863 DIV. 1

LIMITED WAR
PUBLIC OPINION
THE LESSER EVIL: UN INTERVENTION IN KOREA,
AD-603 908 DIV. 32

LINEAR PROGRAMMING
DYNAMIC PROGRAMMING
DYNAMIC LINEAR PROGRAMMING PROBLEMS,
AD-603 981 DIV. 15

LINEAR PROGRAMMING
ECONOMICS
CONCAVE PROGRAMMING FOR GASOLINE BLENDS,
AD-604 208 DIV. 10

LINEAR PROGRAMMING
ITERATIVE METHODS
PRODUCT FORM FOR THE INVERSE IN THE SIMPLEX METHOD,
AD-604 242 DIV. 15
ON A NEW ITERATIVE ALGORITHM FOR FINDING THE SOLUTIONS OF GAMES AND LINEAR PROGRAMMING PROBLEMS,
AD-604 295 DIV. 15

LINEAR PROGRAMMING
NUMERICAL ANALYSIS
COMPUTATIONAL EXPERIENCE IN SOLVING LINEAR PROGRAMMING PROBLEMS,
AD-604 299 DIV. 26

LINEAR PROGRAMMING
OPTIMIZATION
SOLUTION OF A LARGE SCALE TRAVELING SALESMAN PROBLEM,
AD-604 317 DIV. 15

LINEAR PROGRAMMING
SCHEDULING
COMPUTATIONAL TECHNIQUES FOR SCHEDULING PROBLEMS WITH DEFERRAL COSTS,
AD-603 525 DIV. 26
ON THE HITCHCOCK DISTRIBUTION PROBLEM,
AD-603 919 DIV. 15

LIQUID METAL COOLED REACTORS
REACTOR FEASIBILITY STUDIES
A FEASIBILITY STUDY OF A HIGH-TEMPERATURE, LIQUID ALUMINUM COOLED, FLUIDIZED BED NUCLEAR POWER REACTOR,
AD-603 610 DIV. 20

LIQUID METALS
CESIUM
FACTORS AFFECTING THE COMPATIBILITY OF LIQUID CESIUM WITH CONTAINMENT METALS,
AD-603 724 DIV. 17

LIQUID METALS
ELECTRICAL PROPERTIES
RESISTIVITY AND HALL EFFECT IN LIQUID METALS,
AD-603 731 DIV. 25

LITHIUM ALLOYS
CORROSION
STRESS CORROSION TESTS SOME WROUGHT MG-LI BASE ALLOYS,
AD-603 551 DIV. 17

LITHIUM COMPOUNDS
FLUORIDES
CRACK INITIATION IN METALLIC MATERIALS: LITHIUM FLUORIDE CRYSTALS AND AISI 301 STAINLESS STEEL,
AD-603 785 DIV. 17

LOADING (MECHANICS)
DEFLECTION
ULTIMATE STRENGTH OF SINGLE-STORY FRAMES SUBJECTED TO LOADING,
AD-603 676 DIV. 13

LOGISTICS
DYNAMIC PROGRAMMING
APPLICATIONS OF THE THEORY OF DYNAMIC PROGRAMMING TO LOGISTICS,
AD-604 285 DIV. 15

LOGISTICS
GAME THEORY
EXAMPLE IN THE THEORY OF ORGANIZATION,
AD-604 080 DIV. 18

LOOP ANTENNAS
ANTENNA CONFIGURATIONS
INVESTIGATION OF THIN WIRE CIRCULAR LOOP ANTENNAS AND ELECTRONICALLY SCANNED CIRCULAR ARRAYS,
AD-603 966 DIV. 8

LOOP ANTENNAS
EXPERIMENTAL DATA
RADIATING AND CIRCUIT PROPERTIES OF CIRCULAR LOOP ANTENNAS WHEN IMMERSED IN CONDUCTING MEDIA,
AD-603 634 DIV. 8

LOW-PASS FILTERS
TRANSIENTS
TRANSIENT RESPONSE OF BUTTERWORTH APPROXIMATIONS OF IDEAL LOW-PASS FILTERS,
AD-604 153 DIV. 8

LUBRICANTS
SYMPOSIA
PROCEEDINGS OF THE USAF AEROSPACE FLUIDS AND LUBRICANTS CONFERENCE,
AD-604 278 DIV. 14

LUBRICATION
STEAM
INVESTIGATION OF CONDENSING VAPOR LUBRICATED SELF-ACTING JOURNAL BEARINGS,
AD-603 970 DIV. 26

LUBRICATION
TRANSMISSION GEARS
STUDY OF HELICOPTER GEAR LUBRICATION,
AD-603 960 DIV. 1

LUNAR TRAJECTORIES
POSITION FINDING
UNCERTAINTY IN THE ESTIMATE OF POSITION AND VELOCITY ALONG A LUNAR TRAJECTORY USING INDIVIDUAL EARTH-MOON ANGULAR MEASUREMENTS IN A RECURSIVE NAVIGATION THEORY,
AD-603 956 DIV. 19

MAGNESIUM ALLOYS
CASTINGS
DEVELOPMENT OF MANUFACTURING CAPABILITY FOR PRODUCING HIGH PERFORMANCE ALUMINUM AND MAGNESIUM ALLOY CASTINGS,
AD-603 700 DIV. 26

MAGNESIUM ALLOYS
CORROSION
STRESS CORROSION TESTS SOME WROUGHT MG-LI BASE ALLOYS,
AD-603 551 DIV. 17

MAGNETIC FIELDS
SYNTHESIS
METHOD FOR GENERATING A CYLINDRICAL HOMOGENOUS MAGNETIC FIELD VOLUME,
AD-603 616 DIV. 25

MAGNETIC MATERIALS
SINGLE CRYSTALS
CONTRIBUTION OF THE TWO-MAGNON PROCESS TO MAGNETOSTATIC MODE RELAXATION IN HIGHLY POLISHED SPHERES OF SINGLE CRYSTAL

INTEGRAL EQUATIONS
NUMERICAL ANALYSIS
NUMERICAL SOLUTION OF THE PERTURBED HARMONIC OSCILLATOR EQUATION AND THE HARTREE-FOCK MANY-ELECTRON EQUATIONS BY USE OF GREEN'S FUNCTION,
AD-603 407 DIV. 25

INTEGRAL EQUATIONS
THEORY
ON AN INTEGRAL EQUATION,
AD-603 890 DIV. 15

INTEGRALS
CALCULUS OF VARIATIONS
MAXIMIZING AN INTEGRAL WITH A SIDE CONDITION,
AD-604 152 DIV. 15
ON APPROXIMATE EXPRESSIONS FOR THE EXPONENTIAL INTEGRAL AND THE ERROR FUNCTION,
AD-603 898 DIV. 15
ANALYTICAL APPROXIMATIONS OF CHI-SQUARE INTEGRALS,
AD-604 319 DIV. 15

INTEGRATED CIRCUITS
PHOTOENGRAVING
INTEGRATED SILICON DEVICE TECHNOLOGY, VOLUME III, PHOTOENGRAVING,
AD-603 715 DIV. 25

INTERFEROMETERS
MILLIMETER WAVES
MILLIMETER INTERFEROMETER,
AD-603 544 DIV. 8

INVENTORY CONTROL
DYNAMIC PROGRAMMING
BOTTLENECK PROBLEMS AND DYNAMIC PROGRAMMING,
AD-604 219 DIV. 15
BOTTLENECK PROBLEMS, FUNCTIONAL EQUATIONS AND DYNAMIC PROGRAMMING,
AD-604 300 DIV. 15

ION BEAMS
SPUTTERING
BASIC PROCESSES OF ION BEAM TERMINATION WITH APPLICATION TO ELECTRIC PROPULSION TEST FACILITY COLLECTOR SYSTEMS,
AD-603 905 DIV. 27

ION ENGINES
FUEL CONTAMINATION
EFFECT OF IMPURITIES OF CESIUM FUEL UPON ION ENGINES,
AD-603 631 DIV. 10

IONIZATION
LASERS
LASER TRIGGERED SPARK GAP,
AD-603 613 DIV. 25

IONOSPHERE
ATMOSPHERIC SOUNDING
DISPERSIVE CHARACTERISTICS OF THE IONOSPHERE,
AD-604 122 DIV. 2

IONOSPHERE
ELECTRON DENSITY
METHODS FOR OBTAINING ELECTRON DENSITY PROFILES FROM CAPACITIVE IONOSPHERIC ROCKET PROBES,
AD-603 625 DIV. 2

IONOSPHERE
IONIZATION
NEW METHOD FOR EXPLORING THE UPPER IONOSPHERE,
AD-603 797 DIV. 2

IONOSPHERE
WAVE TRANSMISSION
G LAYER OF THE ATMOSPHERE,
AD-603 796 DIV. 2

IONOSPHERIC PROPAGATION
ELECTROMAGNETIC WAVE REFLECTIONS
IONOSPHERIC PROPAGATION STUDIES,
AD-603 776 DIV. 8

IONOSPHERIC PROPAGATION
POLAR REGIONS
POLAR HIGH FREQUENCY RADIO PROPAGATION STUDY,
AD-604 248 DIV. 5

IONOSPHERIC PROPAGATION
RADIO WAVES
GREAT-CIRCLE AND DEVIATED-PATH OBSERVATIONS ON CW SIGNALS USING MODIFIED PINWHEEL TECHNIQUES,
AD-603 772 DIV. 2

IRON ALLOYS
RARE EARTH ELEMENTS
MAGNETIC PROPERTIES OF RARE EARTH-IRON ALLOYS,
AD-603 612 DIV. 17

IRRITATING AGENTS
TISSUES (BIOLOGY)
NEW METHODS DEVELOPMENT FOR IRRITANT SCREENING,
AD-603 789 DIV. 16

ISOCYANATE PLASTICS
MECHANICAL PROPERTIES
RHEOLOGICAL BEHAVIOR OF A FILLED ELASTOMER: MODELING OF SOLID ROCKET PROPELLANTS,
AD-604 019 DIV. 10

ITERATIVE METHODS
FUNCTIONS
APPLICATIONS OF VARIATION-DIMINISHING MATRICES: A GENERAL RULE OF SIGNS: STUDIES ON THE NEWTON-SYLVESTER THEOREM,
AD-603 781 DIV. 15

ITERATIVE METHODS
GAME THEORY
EXTENSION OF THE BROWN-ROBINS ON ITERATIVE PROCESS FOR FINDING THE VALUE OF A GAME,
AD-604 082 DIV. 15

ITERATIVE METHODS
LINEAR PROGRAMMING
PRODUCT FORM FOR THE INVERSE IN THE SIMPLEX METHOD,
AD-604 242 DIV. 15

ITERATIVE METHODS
OPERATIONS RESEARCH
ON A NEW ITERATIVE ALGORITHM FOR FINDING THE SOLUTIONS OF GAMES AND LINEAR PROGRAMMING PROBLEMS,
AD-604 295 DIV. 15

ITERATIVE METHODS
POWER SERIES
ITERATION OF POWER SERIES IN TWO VARIABLES,
AD-603 926 DIV. 15

ITERATIVE METHODS
SPECIAL FUNCTIONS
AN ITERATIVE METHOD OF COMPUTING THE Q-FUNCTION,
AD-604 004 DIV. 15

ITERATIVE METHODS
TOPOLOGY
ITERATES OF FRACTIONAL ORDER,
AD-603 821 DIV. 15

JET BOMBERS
ADAPTIVE CONTROL SYSTEMS
APPLICATION OF THE LIMIT-CYCLE SELF-ADAPTIVE CONCEPT TO THE B-58 LATERAL DIRECTIONAL STABILITY AUGMENTATION SYSTEM,
AD-604 253 DIV. 1

JET ENGINE FUELS
BIOLOGICAL CONTAMINATION
A STUDY OF EXISTING BASE FUEL HANDLING PROCEDURES IN RELATION TO MICROBIAL CONTAMINATION,
AD-603 852 DIV. 10

JET ENGINE FUELS
CORROSION
EFFECT OF JP-5 PROPERTIES ON HOT GAS CORROSION AND FLAME RADIATION,
AD-603 650 DIV. 10

JET MIXING FLOW
TRANSPORT PROPERTIES
TURBULENT TRANSPORT PROPERTIES FOR AXISYMMETRIC HETEROGENEOUS MIXING,
AD-604 008 DIV. 9

JET TRANSPORT PLANES
INSTRUMENT PANELS
ANALYSIS OF CONTROL-DISPLAY LIMITATIONS IN MULTI-JET TRANSPORT AIRCRAFT,
AD-604 065 DIV. 1

JETS
DELTA WINGS
WIND-TUNNEL INVESTIGATION OF THE EFFECTS OF LEADING-EDGE BLOWING JETS UPON THE LIFT, DRAG, AND PITCHING MOMENT OF A 76 DEGREE DELTA WING,
AD-603 904 DIV. 1

JOB ANALYSIS
PROGRAMMING (COMPUTERS)
A NOTE CONCERNING THE ORGANIZATION OF AN IBM 701 INSTALLATION,
AD-604 314 DIV. 23

JOURNAL BEARINGS
LUBRICATION
INVESTIGATION OF CONDENSING VAPOR LUBRICATED SELF-ACTING JOURNAL BEARINGS,
AD-603 970 DIV. 26

K MESONS
NUCLEAR REACTIONS
REGENERATION OF K1 MESONS AND THE K1 -K2 MASS DIFFERENCE,
AD-604 018 DIV. 20

KILL PROBABILITIES
GUIDED MISSILE TARGETS
A MISSILE TARGETING PROBLEM,
AD-603 583 DIV. 12

LABOR
FEMALES
SUPPLY OF FEMALE LABOR IN WORLD WAR II,
AD-604 229 DIV. 23

LABOR
MOTIVATION
TAXATION AND INCENTIVE IN MOBILIZATION,
AD-603 911 DIV. 32

LABOR
PRODUCTION
RUSSIAN LABOR PRODUCTIVITY STATISTICS,
AD-603 845 DIV. 32

LABOR
RETRAINING
RETRAINING AND LABOR MARKET ADJUSTMENT IN WESTERN EUROPE,
AD-603 647 DIV. 23

LABOR
USSR
RELIABILITY OF ESTIMATES OF UNFREE LABOR IN THE USSR,
AD-604 000 DIV. 23
TRENDS AND PROSPECTS OF THE SOVIET POPULATION AND LABOR FORCE,
AD-604 078 DIV. 23

LAMINAR BOUNDARY LAYER
COMPRESSIBLE FLOW
COMPRESSIBLE BOUNDARY LAYER, SOLUTION OF LAMINAR BOUNDARY LAYER EQUATIONS FOR HIGH MACH NUMBERS,
AD-603 920 DIV. 9

LAMINAR BOUNDARY LAYER
EQUATIONS
SOLUTION OF THE LAMINAR BOUNDARY LAYER EQUATIONS FOR A COMPRESSIBLE FLUID WITH VARIABLE PROPERTIES, INCLUDING DISSOCIATION,
AD-604 061 DIV. 9

LAMINATED PLASTICS
FILAMENT WOUND CONSTRUCTION
INTERLAMINAR SHEAR OF FILAMENT-WOUND REINFORCED PLASTICS,
AD-603 504 DIV. 14
RELATIONSHIP OF MOLECULAR STRUCTURE TO PHYSICAL PROPERTIES IN NOVEL EPOXY RESINS,
AD-603 748 DIV. 14

LAMINATES
CERAMIC MATERIALS
DEVELOPMENT OF A 1200F RADOME, THERMAL AND PHYSICAL PROPERTIES OF CERAMIC MATRICES AND GLASS REINFORCED LAMINATES,
AD-603 730 DIV. 8

LANDING GEAR
AEROSPACE PLANES
X-20 (DYNA-SOAR) LANDING GEAR DEVELOPMENT AND QUALIFICATION PROGRAM,
AD-603 703 DIV. 1

LANDING GEAR
VIBRATION ISOLATORS
BAND-PASS SHOCK ABSORBERS FOR AIRCRAFT LANDING GEAR SHOCK STRUTS,
AD-603 749 DIV. 1

LANGUAGE
ECONOMICS
LOGICAL STRUCTURE OF THE UTILITY CONCEPT,
AD-604 148 DIV. 32

LANGUAGE
GROUP DYNAMICS
AN ANALYSIS OF THE METHOD OF TRIADS IN RESEARCH ON THE MEASUREMENT OF MEANING,
AD-603 944 DIV. 28

LANGUAGE
PROCESSING
FACT CORRELATION AS A MEANS OF TEXT REORGANIZATION FOR INFORMATION RETRIEVAL,
AD-603 697 DIV. 30

LANTHANUM COMPOUNDS
CRYSTAL LATTICES
DEPENDANCE OF SPIN-LATTICE RELAXATION TIME UPON MAGNETIC FIELD FOR NEODYMIUM (3+) ION IN MG3LA2(NO3)12 AND IN LAF3
AD-604 089 DIV. 25
NON-DIPOLAR INTERACTION BETWEEN NEAREST NEIGHBOR NEODYMIUM IONS IN LANTHANUM ETHYL SULFATE,
AD-604 090 DIV. 25
NUCLEAR POLARIZATION IN LANTHANUM MAGNESIUM NITRATE CRYSTALS,
AD-604 092 DIV. 25

LASERS
ARSENIC ALLOYS
INJECTION LASER STUDY,
AD-603 651 DIV. 25

LASERS
CAVITY RESONATORS
LASER CAVITIES TERMINATED

VALIDITY OF AGE, EDUCATION, AND GCT SCORE AS PREDICTORS OF TWO-YEAR ATTRITION AMONG NAVAL ENLISTEES,
AD-603 579 DIV. 23

MEDICAL PERSONNEL
CIVIL DEFENSE
THE ROLE OF THE PHARMACIST IN NATIONAL DISASTER,
AD-604 275 DIV. 16

MEMORY
AFTERIMAGES
VISUAL AFTER-IMAGES AS A SOURCE OF INFORMATION,
AD-603 546 DIV. 28

MENTAL DISORDERS
EPIDEMIOLOGY
APPLICATION OF MARKOV PROCESSES TO THE STUDY OF THE EPIDEMIOLOGY OF MENTAL DISEASE,
AD-604 134 DIV. 16

MERCURY
GAS DISCHARGES
PROPERTIES OF HIGH CURRENT, LOW FREQUENCY ELECTRODELESS DISCHARGES EXCITED IN CESIUM, RUBIDIUM, POTASSIUM, AND MERCURY VAPORS,
AD-603 935 DIV. 25

MERCURY
LASERS
RESONANT ENERGY TRANSFER FROM MERCURY TO ZINC IN RELATION TO A GAS LASER,
AD-603 680 DIV. 25

METAL FILMS
COBALT
MAGNETIC PROPERTIES OF FCC SINGLE CRYSTAL COBALT FILMS,
AD-603 720 DIV. 17

METAL FILMS
DIFFUSION
STUDY OF CESIUM ON REFRACTORY METALS USING FIELD EMISSION MICROSCOPY,
AD-603 902 DIV. 17

METALLURGY
REPORTS
TRANSLATION OF RUSSIAN RESEARCH NONFERROUS METALLURGY,
AD-603 549 DIV. 17

METALLURGY
SCIENTIFIC RESEARCH
TRANSLATION OF RUSSIAN RESEARCH: NONFERROUS METALLURGY, 1963, VOL. 6, NO. 3,
AD-603 663 DIV. 17

METAL-FORMING PRESSES
EXTRUSION
DEVELOPMENT OF IMPROVED LINER FOR EXTRUSION BILLET CONTAINERS,
AD-604 172 DIV. 26

METEORITES
ANALYSIS
TECHNIQUES FOR IDENTIFICATION HANDLING AND ANALYSIS OF EXTRA-TERRESTRIAL PARTICLES,
AD-603 964 DIV. 2

METEOROLOGICAL SATELLITES
PHOTOGRAPHY
EVALUATION OF ERRORS IN THE GRAPHICAL RECTIFICATION OF SATELLITE PHOTOGRAPHS,
AD-603 574 DIV. 2

METEORS
ABLATION
DECELERATION AND MASS CHANGE OF AN ABLATING BODY DURING HIGH-VELOCITY MOTION IN THE ATMOSPHERE,
AD-604 058 DIV. 25

METHANE
OXIDATION
CATALYST SELECTION: AN APPLICATION OF GROUP SCREENING,
AD-604 263 DIV. 4

MICROWAVE AMPLIFIERS
PHASE SHIFT
CALCULATION OF INTRA-PULSE PHASE SHIFT IN LINEAR BEAM MICROWAVE TUBES,
AD-603 712 DIV. 8

MICROWAVE EQUIPMENT
COLD CATHODE TUBES
THIN-FILM COLD CATHODES FOR MICROWAVE TUBES,
AD-603 762 DIV. 8

MICROWAVE SPECTROSCOPY
ERRORS
MEASUREMENT OF NARROW MAGNETIC RESONANCE LINEWIDTHS,
AD-603 900 DIV. 25

MICROWAVES
GENERATORS
PLASMA KINETIC ENERGY-MICROWAVE CONVERSION,
AD-604 120 DIV. 8

MICROWAVES
PLASMA PHYSICS
INTERACTION OF ELECTROMAGNETIC WAVES AND CLASSICAL PLASMAS,
AD-603 523 DIV. 25

MICROWAVES
PROPAGATION
SMALL-SIGNAL NONLINEAR KLYSTRON WAVES,
AD-603 573 DIV. 8

MILITARY ORGANIZATIONS
GAME THEORY
EXAMPLE IN THE THEORY OF ORGANIZATION,
AD-604 080 DIV. 18

MILITARY ORGANIZATIONS
SOCIOLOGY
DISCUSSION OF QUESTIONS PROMPTED BY TWO VOLUMES ON 'THE AMERICAN SOLDIER': SOCIOLOGY OF MILITARY ORGANIZATION,
AD-603 843 DIV. 32

MILITARY PERSONNEL
UNITED STATES
DISCUSSION OF QUESTIONS PROMPTED BY TWO VOLUMES ON 'THE AMERICAN SOLDIER': SOCIOLOGY OF MILITARY ORGANIZATION,
AD-603 843 DIV. 32

MILITARY STRATEGY
AERIAL WARFARE
SOME NOTES ON THE EVOLUTION OF AIR DOCTRINE,
AD-604 325 DIV. 18

MILITARY STRATEGY
NATIONAL DEFENSE
MORALS AND STRATEGY,
AD-603 672 DIV. 18

MILITARY STRATEGY
NORTH KOREA
U. S. REACTION TO NORTH KOREAN AGGRESSION,
AD-604 322 DIV. 18

MILITARY STRATEGY
NUCLEAR WEAPONS
MILITARY AND POLITICAL IMPLICATIONS OF NUCLEAR WEAPON DEVELOPMENTS,
AD-604 244 DIV. 18

MILITARY STRATEGY
THEORY
RATIONALIZING NATO STRATEGY,
AD-603 673 DIV. 18

MILITARY STRATEGY
UNITED STATES
POSSIBLE U. S. MILITARY STRATEGIES,
AD-604 324 DIV. 18

MILITARY STRATEGY
USSR
SOVIET STRATEGIC DEBATE: AN IMPORTANT RECENT ADDENDUM,
AD-604 272 DIV. 18

MILITARY STRATEGY
WEAPONS
MILITARY DEMONSTRATION AND DISCLOSURE OF NEW WEAPONS,
AD-604 201 DIV. 18

MILLIMETER WAVES
DETECTION
FREQUENCY SELECTIVE POWER METER FOR MILLIMETER WAVES,
AD-604 021 DIV. 8

MILLIMETER WAVES
PLASMA OSCILLATIONS
MILLIMETER WAVE GENERATION BY PLASMA,
AD-604 088 DIV. 25

MOBILIZATION
ECONOMICS
TAXATION AND INCENTIVE IN MOBILIZATION,
AD-603 911 DIV. 32

MODULATION
LIGHT COMMUNICATION SYSTEMS
HETERODYNE DETECTION IN OPTICAL COMMUNICATION,
AD-603 622 DIV. 5

MOLECULAR SPECTROSCOPY
HYDROGEN
COHERENT INFRARED LASER: HYDROGEN SPECTROSCOPY,
AD-603 658 DIV. 25

MOLECULAR SPECTROSCOPY
PRESSURE
MEASUREMENT OF PRESSURE INDUCED SHIFTS OF ABSORPTION LINES IN THE INFRARED SPECTRUM,
AD-603 937 DIV. 25

MOLYBDENUM
FRACTURE (MECHANICS)
TENSILE DUCTILITY-TRANSITION IN MOLYBDENUM,
AD-603 498 DIV. 17

MONEY
ECONOMICS
DEPRECIATION, REPLACEMENT AND GROWTH,
AD-604 143 DIV. 32

MONITORS
VOICE COMMUNICATION SYSTEMS
ULTRA-SENSITIVE VOICE TRANSMISSION INDICATING CIRCUIT,
AD-604 271 DIV. 5

MONOMOLECULAR FILMS
WATER WAVES
PHYSICAL AND CHEMICAL PARAMETERS AFFECTING THE DAMPING OF CAPILLARY WATER WAVES BY MONOMOLECULAR LAYERS OF ORGANIC MATERIALS,
AD-604 249 DIV. 2

MONTE CARLO METHOD
NEUTRON ABSORPTION
STOCHASTIC (MONTE CARLO) ATTENUATION ANALYSIS,
AD-603 830 DIV. 20

MOON
BIBLIOGRAPHIES
BIBLIOGRAPHY OF EXTRATERRESTRIAL RESEARCH,
AD-604 105 DIV. 2

MOTOR REACTIONS
HANDS
FINGER DEXTERITY OF THE PRESSURE-SUITED SUBJECT,
AD-603 705 DIV. 16

MUCIN
CHEMICAL ANALYSIS
DISTRIBUTION AND COMPOSITION OF SIALIC ACIDS AND GLYCOPROTEINS,
AD-603 717 DIV. 16

MULTIPATH TRANSMISSION
SIGNALS
ON THE OPTIMUM DESIGN OF MULTIPATH SIGNALS,
AD-603 591 DIV. 8

MUNITIONS INDUSTRY
MANAGEMENT ENGINEERING
MUNITIONS PRODUCTION: UTILIZATION OF U. S. MANUFACTURING INDUSTRIES KNOW-HOW,
AD-604 071 DIV. 22

NAVAL PERSONNEL
LEADERSHIP
EVALUATION OF A POPULAR LEADER,
AD-603 580 DIV. 28
THE VALIDITY OF PEER RATINGS FROM OCS IN PREDICTING OFFICER PERFORMANCE: A FOLLOW-UP OF THE 1955 NEWPORT STUDY,
AD-604 184 DIV. 23

NAVAL PERSONNEL
PERFORMANCE (HUMAN)
BODY SIZE, SELF EVALUATION, AND MILITARY EFFECTIVENESS,
AD-603 578 DIV. 28

NAVAL PERSONNEL
SELECTION
PRACTICAL VALUE OF A PSYCHIATRIC SCREENING INTERVIEW IN PREDICTING MILITARY INEFFECTIVENESS,
AD-603 577 DIV. 23
VALIDITY OF AGE, EDUCATION, AND GCT SCORE AS PREDICTORS OF TWO-YEAR ATTRITION AMONG NAVAL ENLISTEES,
AD-603 579 DIV. 23

NAVAL RESEARCH
OCEANOGRAPHIC DATA
SOURCE MATERIAL OF THE WESTERN NORTH ATLANTIC: AN INVENTORY,
AD-604 182 DIV. 2

NAVIGATION SATELLITES
COMMUNICATION THEORY
REPRESENTATION AND ANALYSIS OF SIGNALS: PART XVIII: VECTOR AND TENSOR ALGEBRA OF SIGNALS APPLIED TO SATELLITE NAVIGATION,
AD-603 775 DIV. 8

NEODYMIUM
ELECTRIC MOMENTS
NON-DIPOLAR INTERACTION BETWEEN NEAREST NEIGHBOR NEODYMIUM IONS IN LANTHANUM ETHYL SULFATE,
AD-604 090 DIV. 25

NEODYMIUM
RELAXATION TIME
DEPENDANCE OF SPIN-LATTICE RELAXATION TIME UPON MAGNETIC FIELD FOR NEODYMIUM (3+) ION IN MG3LA2(NO3)12 AND IN LAF3,
AD-604 089 DIV. 25

NERVOUS SYSTEM
SLEEP
NEUROPHYSIOLOGICAL INHIBITORY SYSTEMS ACTIVE DURING SLEEP,
AD-603 737 DIV. 16

PURE YTTRIUM IRON GARNET (YIG),
AD-603 934 DIV. 25

MAGNETIC RESONANCE
MAGNETIC MATERIALS
CONTRIBUTION OF THE TWO-MAGNON PROCESS TO MAGNETOSTATIC MODE RELAXATION IN HIGHLY POLISHED SPHERES OF SINGLE CRYSTAL PURE YTTRIUM IRON GARNET (YIG),
AD-603 934 DIV. 25

MAGNETIC RESONANCE
SPECTRUM ANALYZERS
MEASUREMENT OF NARROW MAGNETIC RESONANCE LINEWIDTHS,
AD-603 900 DIV. 25

MAGNETOHYDRODYNAMICS
ENERGY CONVERSION
EFFECTS OF PARTIAL CONDENSATION AROUND IONS IN ELECTROFLUID DYNAMIC ENERGY CONVERSION PROCESSES,
AD-603 681 DIV. 25

MAGNETOHYDRODYNAMICS
GAS DISCHARGES
PROPERTIES OF HIGH CURRENT, LOW FREQUENCY ELECTRODELESS DISCHARGES EXCITED IN CESIUM, RUBIDIUM, POTASSIUM, AND MERCURY VAPORS,
AD-603 935 DIV. 25

MAGNETOHYDRODYNAMICS
THEORY
MAGNETOHYDRODYNAMIC CHARACTERISTICS AND SHOCK WAVES,
AD-603 951 DIV. 25

MAGNETOSTRICTIVE ELEMENTS
TRANSDUCERS
MEASUREMENTS ON FREE-FLOODED MAGNETOSTRICTIVE RING TRANSDUCERS FOR DEEP-SUBMERGENCE APPLICATIONS,
AD-603 897 DIV. 25

MAGNETRONS
CASCADE STRUCTURES
APPLIED RESEARCH ON EXTENDED INTERACTION IN ICEM MAGNETRONS,
AD-603 547 DIV. 8

MAINTAINABILITY
COMMAND + CONTROL SYSTEMS
TEST REPORT FOR MAINTAINABILITY AND MAN-MACHINE INTERFACE DEMONSTRATION PLAN,
AD-603 587 DIV. 18

MANAGEMENT ENGINEERING
DECISION MAKING
USER-ORIENTED INFORMATION PROCESSING SYSTEM FOR MANAGERIAL PERSONNEL,
AD-604 277 DIV. 26

MANAGEMENT PLANNING
LINEAR PROGRAMMING
COMPUTATIONAL EXPERIENCE IN SOLVING LINEAR PROGRAMMING PROBLEMS,
AD-604 299 DIV. 26

MANAGEMENT PLANNING
THEORY
POLICY SCIENCES: ASPIRATION AND OUTLOOK,
AD-604 076 DIV. 26

MANEUVERING SATELLITES
ELECTRIC PROPULSION
RADIAL AND BINORMAL THRUSTING TECHNIQUES FOR MANEUVERING SATELLITES IN NEAR EARTH SPACE,
AD-603 699 DIV. 27

MANNED SPACECRAFT
RESEARCH PROGRAM ADMINISTRATION
INVESTIGATION OF AEROSPACE VEHICLE CREW STATION CRITERIA,
AD-603 784 DIV. 12

MANPOWER STUDIES
UNITED STATES
SUPPLY OF FEMALE LABOR IN WORLD WAR II,
AD-604 229 DIV. 23

MANPOWER STUDIES
USSR
RELIABILITY OF ESTIMATES OF UNFREE LABOR IN THE USSR,
AD-604 000 DIV. 23
TRENDS AND PROSPECTS OF THE SOVIET POPULATION AND LABOR FORCE,
AD-604 078 DIV. 23

MANUFACTURING METHODS
TRANSISTORS
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS,
AD-604 196 DIV. 8

MAPPING (TRANSFORMATIONS)
GAME THEORY
ISOMORPHISM OF GAMES, AND STRATEGIC EQUIVALENCE,
AD-603 809 DIV. 15

MAPPING (TRANSFORMATIONS)
SEQUENCES
BROUWER TYPE SPACE TO REPLACE THE CONVENTIONAL PHYSICAL CONTINUUM WHEN PARTICLES ARE REGARDED AS DISTINCTION SYSTEMS,
AD-604 044 DIV. 15

MAPS
TRANSFORMATIONS
COORDINATE TRANSFORMATION OF MAPS,
AD-604 169 DIV. 2

MARAGING STEELS
FRACTURE (MECHANICS)
EFFECT OF CRACK SHAPE ON FRACTURE TOUGHNESS OF MARAGING STEELS, TEMPERED STEEL AND TITANIUM ALLOYS,
AD-604 056 DIV. 17

MASERS
SEMICONDUCTOR DEVICES
INVESTIGATION OF MULTIPLE SPIN FLIP PROCESSES TO PRODUCE TRANSITIONS AND INVERSIONS AT ARBITRARY FREQUENCIES,
AD-603 553 DIV. 25

MATHEMATICAL ANALYSIS
CONTROL SYSTEMS
THE SENSITIVITY OF GENERAL MULTIVARIABLE FEEDBACK SYSTEMS,
AD-604 096 DIV. 15

MATHEMATICAL ANALYSIS
STRESSES
SOME RECENT DEVELOPMENTS IN LINEAR VISCOELASTIC STRESS ANALYSIS,
AD-603 557 DIV. 25

MATHEMATICAL LOGIC
DECISION THEORY
THE PROBLEM OF IDENTIFICATION OF DISCRETE-TIME PROCESSES,
AD-603 739 DIV. 15

MATHEMATICAL LOGIC
FUNCTIONS
STRUCTURAL ANALYSIS OF MANY VALUED LOGIC,
AD-604 045 DIV. 15

MATHEMATICAL MODELS
ANALYSIS OF VARIANCE
NON-SEQUENTIAL DESIGNS FOR THE ESTIMATION OF PARAMETERS IN NON-LINEAR MODELS,
AD-604 264 DIV. 15

MATHEMATICAL MODELS
CHEMOTHERAPY
THREE-ORGAN DRUG DISTRIBUTION MODEL INCLUDING THE KIDNEY,
AD-603 675 DIV. 16

MATHEMATICAL MODELS
DECISION MAKING
TESTING ORGANIZATION THEORIES,
AD-604 135 DIV. 28
THE INFLUENCE OF ENVIRONMENTAL NON-STATIONARITY IN A SEQUENTIAL DECISION-MAKING EXPERIMENT,
AD-604 156 DIV. 28

MATHEMATICAL MODELS
ECONOMICS
A COMPARISON OF TREATMENTS OF A DUOPOLY SITUATION,
AD-603 925 DIV. 32
CLASSICAL TAX SUBSIDY PROBLEM,
AD-604 163 DIV. 32

MATHEMATICAL MODELS
GAME THEORY
TOTAL RECONNAISSANCE WITH TOTAL COUNTERMEASURES: SIMPLIFIED MODEL,
AD-603 838 DIV. 15

MATHEMATICAL MODELS
LINEAR SYSTEMS
COMMENTS ON SOLOW 'STRUCTURE OF LINEAR MODELS',
AD-604 086 DIV. 32

MATHEMATICAL MODELS
SEQUENTIAL ANALYSIS
SEQUENTIAL DESIGN OF EXPERIMENTS FOR NON-LINEAR MODELS,
AD-604 258 DIV. 30

MATHEMATICAL MODELS
STATISTICAL ANALYSIS
BAYESIAN ANALYSIS OF THE AGGRESSION MODEL WITH AUTOCORRELATED ERRORS,
AD-604 259 DIV. 15
BAYESIAN ESTIMATION OF MULTIVARIATE REGRESSION,
AD-604 260 DIV. 15
EVALUATING MATHEMATICAL MODELS OF PHYSICAL MECHANISMS,
AD-604 265 DIV. 15

MATHEMATICAL MODELS
STATISTICAL PROCESSES
APPLICATION OF MARKOV PROCESSES TO THE STUDY OF THE EPIDEMIOLOGY OF MENTAL DISEASE,
AD-604 134 DIV. 16

MATHEMATICAL MODELS
STOCHASTIC PROCESSES
BRANCHING PROCESSES,
AD-603 799 DIV. 15
SOME MATHEMATICAL MODELS FOR BRANCHING PROCESSES,
AD-603 880 DIV. 15

MATHEMATICAL MODELS
URBAN PLANNING
COMPUTER MODEL OF THE SPATIAL ORGANIZATION OF HUMAN ACTIVITIES WITHIN A METROPOLITAN AREA,
AD-603 670 DIV. 2

MATHEMATICAL PREDICTION
THEOREMS
EXPECTATIONS, POSITIVE TRANSFORMATIONS AND TAUBERIAN THEOREMS,
AD-603 884 DIV. 15
MATHEMATICAL METHODS AND TECHNIQUES IN ECONOMICS,
AD-604 210 DIV. 15

MATHEMATICS
GAME THEORY
NEW CURRENTS IN MATHEMATICS,
AD-604 132 DIV. 15

MATRIX ALGEBRA
COMMUNICATION THEORY
ON THE OPTIMUM DESIGN OF MULTIPATH SIGNALS,
AD-603 591 DIV. 8
REPRESENTATION AND ANALYSIS OF SIGNALS: PART XVIII: VECTOR AND TENSOR ALGEBRA OF SIGNALS APPLIED TO SATELLITE NAVIGATION,
AD-603 773 DIV. 8

MATRIX ALGEBRA
COMPUTERS
MATRIX INVERSION ON AN AUTOMATIC CALCULATOR BY ROW AND COLUMN PARTITIONING,
AD-604 226 DIV. 30

MATRIX ALGEBRA
ECONOMICS
NON-NEGATIVE SQUARE MATRICES,
AD-604 139 DIV. 15

MATRIX ALGEBRA
ELECTRICAL NETWORKS
REALIZATION OF THE A-MATRIX OF HALF-DEGENERATE RLC NETWORKS,
AD-603 686 DIV. 7

MATRIX ALGEBRA
GAME THEORY
SOLUTIONS OF DISCRETE, TWO-PERSON GAMES,
AD-603 812 DIV. 15
SOME NOTES ON COMPUTATION OF GAMES SOLUTIONS,
AD-603 823 DIV. 15
METHODS OF SOLUTION IN GAME THEORY,
AD-603 837 DIV. 15

MATRIX ALGEBRA
INEQUALITIES
NOTES ON MATRIX THEORY: AN INEQUALITY DUE TO BERGSTROM,
AD-604 293 DIV. 15

MATRIX ALGEBRA
LINEAR PROGRAMMING
SOLUTION OF A LARGE SCALE TRAVELING SALESMAN PROBLEM,
AD-604 317 DIV. 18

MATRIX ALGEBRA
NUMERICAL METHODS AND PROCEDURES
A NOTE ON THE NUMERICAL PROBLEM OF MATRIX INVERSION,
AD-603 803 DIV. 15

MATRIX ALGEBRA
PROGRAMMING (COMPUTERS)
NONLINEAR SHELL MATRIX ANALYSIS,
AD-603 527 DIV. 1
NOTE ON PRIMITIVE MATRICES,
AD-604 155 DIV. 15

MATRIX ALGEBRA
TRANSFORMATIONS (MATHEMATICS)
INTRODUCTION AND BEGINNER'S GUIDE TO MATRIX PSEUDOINVERSES
AD-604 174 DIV. 15

MEASURE THEORY
THEOREMS
AXIOMATIC APPROACH TO MEASURABLE UTILITY,
AD-604 140 DIV. 15

MECHANICAL WAVES
PROPAGATION
CONSTANT STRAIN WAVES IN STRINGS,
AD-604 164 DIV. 25

MEDICAL EXAMINATION
NAVAL PERSONNEL
PRACTICAL VALUE OF A PSYCHIATRIC SCREENING INTERVIEW IN PREDICTING MILITARY INEFFECTIVENESS,
AD-603 577 DIV. 23

NUMERICAL ANALYSIS
PROBABILITY
FIRST PASSAGE AND RECURRENCE DISTRIBUTIONS,
AD-603 915 DIV. 15

NUMERICAL ANALYSIS
SONAR SIGNALS
COMPARISON OF SEVERAL METHODS OF CALCULATING PISTON VELOCITIES OF AN ARRAY IN RECEPTION,
AD-603 590 DIV. 6

NUMERICAL ANALYSIS
TRANSCENDENTAL FUNCTIONS
HAND COLLECTION OF ILLUSTRATIVE APPROXIMATIONS,
AD-604 126 DIV. 15

NUMERICAL METHODS AND PROCEDURES
CAPACITANCE
A RANDOM WALK RELATED TO THE CAPACITANCE OF THE CIRCULAR PLATE CONDENSER,
AD-604 141 DIV. 7

NUMERICAL METHODS AND PROCEDURES
FIELD THEORY
SINGULAR LOGARITHMIC POTENTIALS AND PERATIZATION,
AD-604 099 DIV. 25

NUMERICAL METHODS AND PROCEDURES
MATRIX ALGEBRA
A NOTE ON THE NUMERICAL PROBLEM OF MATRIX INVERSION,
AD-603 803 DIV. 15

NUMERICAL METHODS AND PROCEDURES
POWER SERIES
PERTURBATION METHODS INVOLVING EXPANSIONS IN TERMS OF A PARAMETER,
AD-604 288 DIV. 15

NUMERICAL METHODS AND PROCEDURES
WEATHER FORECASTING
INVERSION OF THE OMEGA-EQUATION,
AD-603 571 DIV. 2

N-HETEROCYCLIC COMPOUNDS
COMPLEX COMPOUNDS
REFLECTANCE SPECTRA AND THE COORDINATION OF DIVALENT METAL IONS IN 5-TRIFLUOROMETHYLTETRAZOLE COMPLEXES,
AD-604 185 DIV. 4

OCEAN CURRENTS
TROPICAL REGIONS
NARRATIVE OF CHAIN CRUISE NO. 17, PHASE II ST. GEORGE, BERMUDA, TO FREETOWN, SIERRA LEONE,
AD-604 094 DIV. 2

OCEANOLOGY
ATLANTIC OCEAN
NARRATIVE OF CHAIN CRUISE NO. 17, PHASE II ST. GEORGE, BERMUDA, TO FREETOWN, SIERRA LEONE,
AD-604 094 DIV. 2

OFFICER PERSONNEL
SELECTION
THE VALIDITY OF PEER RATINGS FROM OCS IN PREDICTING OFFICER PERFORMANCE: A FOLLOW-UP OF THE 1955 NEWPORT STUDY,
AD-604 184 DIV. 23

OFFICER PERSONNEL
WEST GERMANY
GERMAN REARMAMENT AND THE OLD MILITARY ELITE,
AD-604 286 DIV. 32

OPERATIONS RESEARCH
PROPAGANDA
SYSTEM APPROACH TO PERSUASIVE COMMUNICATIONS,
AD-603 721 DIV. 18

OPERATIONS RESEARCH
RADAR INTERFERENCE
APPLICATION OF OPERATIONS RESEARCH TO INTERFERENCE,
AD-604 068 DIV. 8

OPERATIONS RESEARCH
SCHEDULING
DIVISIBLE ACTIVITIES IN CRITICAL PATH ANALYSIS,
AD-603 990 DIV. 15

OPERATIONS RESEARCH
STANDARDS
SUB-OPTIMIZATION CRITERIA AND OPERATIONS RESEARCH,
AD-604 211 DIV. 24

OPERATORS (PERSONNEL)
PERFORMANCE (HUMAN)
TIME HISTORY AS AN INFORMATION SOURCE FOR OPERATOR CONTROL OF ORBITAL RENDEZVOUS,
AD-603 597 DIV. 23

OPTICAL EQUIPMENT
PHOTOGRAPHIC RECORDING MEDIA
MATRIX CONTROLLED DISPLAY DEVICE,
AD-603 545 DIV. 24

OPTICAL FILTERS
PERFORMANCE (ENGINEERING)
OPTICAL SPATIAL FILTER SYSTEM,
AD-604 247 DIV. 25

OPTICAL PROPERTIES
STARS
RADIATIVE OPACITY OF STELLAR MATTER,
AD-604 159 DIV. 2

OPTICS
REFLECTORS
TRANSVERSE FOCAL REGION OF A SPHERICAL REFLECTOR: PART II GEOMETRIC OPTICS,
AD-603 788 DIV. 8

ORGANIC NITROGEN COMPOUNDS
CHEMICAL EQUILIBRIUM
SYNTHESIS OF CYCLOALKANONE ALKYLHYDRAZONES AND FACTORS INFLUENCING ISOMERIZATION TO CYCLOALKANE AZO ALKANES,
AD-603 684 DIV. 4

ORGANIC NITROGEN COMPOUNDS
PHOTOCHEMISTRY
HIGH INTENSITY PHOTOLYSIS OF AZO COMPOUNDS AT 3600 A,
AD-603 679 DIV. 4

OSCILLATORS
EXTREMELY LOW FREQUENCY
WIEN-BRIDGE OSCILLATOR AS A LOW-FREQUENCY REFERENCE SOURCE,
AD-604 101 DIV. 8

OSCILLATORS
LASERS
LIGHT MODULATION DETECTOR, STABILIZATION OF A LASER LOCAL OSCILLATOR,
AD-604 022 DIV. 8

OXYGEN
CRYOPUMPING
CRYOPUMPING CAPTURE COEFFICIENTS OF TWO NITROGEN-OXYGEN GAS MIXTURES,
AD-603 623 DIV. 25

OXYGEN
FUEL CELLS
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL,
AD-604 114 DIV. 7

OXYGEN
IONIZATION
ATOMIC COLLISION PROCESSES IN ATMOSPHERIC GASES,
AD-603 532 DIV. 4

NETHERLANDS
TERMINAL FLIGHT FACILITIES
SIMULATOR COMPARISON OF NETHERLANDS LANDING ZONE LIGHTING PATTERNS,
AD-603 863 DIV. 1

NETWORKS
SENSITIVITY
USE OF SENSITIVITY AS A CRITERION IN THE SYNTHESIS OF ACTIVE NETWORKS,
AD-603 857 DIV. 8

NETWORKS
TOPOLOGY
PRINCIPLES OF UNISTOR GRAPHS; APPLICATION TO COMMUNICATION NETWORKS,
AD-604 095 DIV. 5

NEUTRON ABSORPTION
SAMPLING
STOCHASTIC (MONTE CARLO) ATTENUATION ANALYSIS,
AD-603 830 DIV. 20

NEUTRON AGE
DETERMINATION
THEORETICAL CALCULATION OF NEUTRON AGE,
AD-603 603 DIV. 20

NEUTRON CROSS SECTIONS
NEUTRON ABSORPTION
REGULARITIES IN THERMAL NEUTRON ABSORPTION CROSS SECTIONS,
AD-604 195 DIV. 20

NICKEL ALLOYS
CORROSION
EFFECT OF JP-5 PROPERTIES ON HOT GAS CORROSION AND FLAME RADIATION,
AD-603 650 DIV. 10

NIOBIUM ALLOYS
REFRACTORY COATINGS
HIGH-TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS,
AD-603 774 DIV. 14

NITROGEN
ATOMIZATION
ELECTRICAL ATOMIZATION OF VOLATILE LIQUIDS (IONICALLY DOPED WATER AND LIQUID NITROGEN),
AD-603 682 DIV. 25

NITROGEN
CRYOPUMPING
CRYOPUMPING CAPTURE COEFFICIENTS OF TWO NITROGEN-OXYGEN GAS MIXTURES,
AD-603 623 DIV. 25

NITROGEN
IGNITION
HEAT TRANSFER OF HOT NITROGEN IGNITION IN ROCKET IGNITERS,
AD-603 816 DIV. 10

NITROGEN
SEPARATION
TRANSLATION OF RUSSIAN RESEARCH; PHYSICAL BASIS OF SEPARATING HELIUM AND NITROGEN,
AD-603 976 DIV. 25

NITROGEN COMPOUNDS
FLUORIDES
OBSERVATION AND KINETIC INVESTIGATION OF THE NF AND NF2 RADICALS,
AD-603 653 DIV. 4

NITROGEN COMPOUNDS
NUCLEAR MAGNETIC RESONANCE
CHEMICAL APPLICATIONS OF NUCLEAR MAGNETIC RESONANCE,
AD-603 735 DIV. 4

NITROGEN COMPOUNDS
OXIDES
CONSTANT PRESSURE DOCOMPOSITION OF NITROUS OXIDE, N2O + .88N2; AND N2O + AIR MIXTURES AT 11.2 ATM, AND INITIAL TEMPERATURES FROM 722K TO 1233K,
AD-603 620 DIV. 4

NOISE
MEASUREMENT
TRANSMISSION OF SOUND IN A MOVING FLUID,
AD-604 123 DIV. 25

NOISE
STATISTICAL DATA
EVALUATION F NOISE SAMPLES; STATISTICAL PROPERTIES OF GAUSSIAN NOISE,
AD-603 984 DIV. 8

NOISE (RADIO)
RADIO RECEIVERS
RECEIVER SYSTEM NOISE STUDY,
AD-603 627 DIV. 8

NOISE (RADIO)
STATISTICAL ANALYSIS
PASSAGE OF STATIONARY PROCESSES THROUGH LINEAR AND NONLINEAR DEVICES,
AD-604 228 DIV. 8

NONLINEAR DIFFERENTIAL EQUATIONS
HARMONIC ANALYSIS
ON CERTAIN RELAXATION OSCILLATIONS; ASYMPTOTIC SOLUTIONS,
AD-603 687 DIV. 15
ON CERTAIN RELAXATION OSCILLATIONS; CONFINING REGIONS,
AD-603 688 DIV. 15

NON-DESTRUCTIVE TESTING
STEEL
EXPERIMENTAL ELECTROMAGNETIC TEST METHODS FOR THE NONDESTRUCTIVE EVALUATION OF CARBURIZED STEEL PARTS,
AD-603 536 DIV. 24

NUCLEAR ENGINEERING
TEST FACILITIES
DESIGN OF A CRYOSTAT FOR THE AIR FORCE NUCLEAR ENGINEERING TEST FACILITY,
AD-603 609 DIV. 20

NUCLEAR EXPLOSION DAMAGE
NUCLEAR WEAPONS
WAR DAMAGE INSURANCE,
AD-604 321 DIV. 18

NUCLEAR EXPLOSION DAMAGE
REPLACEMENT THEORY
COMPENSATION FOR WAR DAMAGE; AN ECONOMIC VIEW,
AD-604 320 DIV. 18

NUCLEAR EXPLOSIONS
CHARGED PARTICLES
TIME BEHAVIOR OF CHARGED PARTICLES INJECTED BY 1962 HIGH ALTITUDE RUSSIAN NUCLEAR TESTS,
AD-603 599 DIV. 20

NUCLEAR EXPLOSIONS
ELECTROMAGNETIC WAVES
RADIO EMISSION FROM A NUCLEAR EXPLOSION; CRITIQUE AND CORRECTION OF KOMPANEETS COMPUTATION OF THE RADIO SIGNAL,
AD-603 709 DIV. 20
DEVELOPMENT OF EQUIPMENT TO CONDUCT AN AREA SURVEY MEASUREMENTS OF THE ELECTROMAGNETIC PULSES FROM NUCLEAR EXPLOSIONS,
AD-603 928 DIV. 20

NUCLEAR MAGNETIC RESONANCE
CHEMISTRY
CHEMICAL APPLICATIONS OF NUCLEAR MAGNETIC RESONANCE,
AD-603 735 DIV. 4

NUCLEAR PARTICLES
DISTRIBUTION
PROTOTYPE MANUAL FOR PLANNING, ANALYZING AND SCHEDULING FOR RADIOLOGICAL EXPOSURE,
AD-603 640 DIV. 18

NUCLEAR REACTORS
ANALYSIS
NUCLEAR ANALYSIS OF GASEOUS CORE REACTORS USING AN APPROXIMATE MULTI-GROUP TRANSPORT THEORY TECHNIQUE,
AD-603 683 DIV. 20

NUCLEAR REACTORS
CRITICAL ASSEMBLIES
NUCLEAR CRITICALITY CALCULATIONS ON A SPHERICALLY SYMMETRIC GASEOUS-CORE REACTOR,
AD-603 619 DIV. 20

NUCLEAR RESONANCE
SULFUR
RESONANCES IN THE S32, 33, 34 (P, GAMMA) CL33, 34, 35 REACTIONS WITH BOMBARDING ENERGIES IN THE ONE MEV TO TWO MEV RANGE,
AD-603 601 DIV. 20

NUCLEAR SPINS
HALOGENATED HALOCARBONS
TEMPERATURE DEPENDENCE OF THE F-F COUPLING CONSTANTS IN 2-FLUOROBENZOTRIFLUORIDES,
AD-603 636 DIV. 4

NUCLEAR WARFARE
CIVIL DEFENSE SYSTEMS
ARE WE SURE ABOUT DISPERSAL
AD-604 128 DIV. 18

NUCLEAR WARFARE
MILITARY STRATEGY
ATOMIC WEAPONS AND GROUND COMBAT; SEARCH FOR ORGANIZATION AND DOCTRINE,
AD-604 306 DIV. 18
POSSIBLE U, S, MILITARY STRATEGIES,
AD-604 324 DIV. 18

NUCLEAR WARFARE
PASSIVE DEFENSE
WAR DAMAGE INSURANCE,
AD-604 321 DIV. 18

NUCLEAR WARFARE
POLITICAL SCIENCE
MILITARY AND POLITICAL IMPLICATIONS OF NUCLEAR WEAPON DEVELOPMENTS,
AD-604 244 DIV. 18

NUCLEAR WARFARE
UNITED STATES
VULNERABILITY OF THE UNITED STATES TO NUCLEAR ATTACK,
AD-604 240 DIV. 18

NUMBER THEORY
BINARY ARITHMETIC
CONCERNING COMPOUND RANDOMIZATION IN THE BINARY SYSTEM,
AD-603 798 DIV. 15

NUMBERS
GAME THEORY
ON CERTAIN GAMES WITH TRANSCENDENTAL VALUES,
AD-603 896 DIV. 15

NUMBERS
PROBABILITY
HISTORY OF RAND'S RANDOM DIGITS; SUMMARY,
AD-603 841 DIV. 15

NUMBERS
STATISTICAL TESTS
A LARGE SAMPLE TEST OF THE HYPOTHESIS THAT ONE OF TWO RANDOM VARIABLES IS STOCHASTICALLY LARGER THAN THE OTHER,
AD-603 893 DIV. 15

NUMERICAL ANALYSIS
BESSEL FUNCTIONS
ANALYTICAL APPROXIMATIONS OF BESSEL FUNCTIONS,
AD-604 167 DIV. 15
ANALYTICAL APPROXIMATIONS OF BESSEL FUNCTIONS OF IMAGINARY ARGUMENT,
AD-604 203 DIV. 15
ANALYTICAL APPROXIMATIONS OF BESSEL FUNCTIONS OF IMAGINARY ARGUMENT,
AD-604 212 DIV. 15
ANALYTICAL APPROXIMATIONS OF BESSEL FUNCTIONS OF IMAGINARY ARGUMENT,
AD-604 214 DIV. 15
ANALYTICAL APPROXIMATIONS OF BESSEL FUNCTIONS AND MACH NUMBERS,
AD-604 223 DIV. 15

NUMERICAL ANALYSIS
DIFFERENTIAL EQUATIONS
NOTE ON THE NUMERICAL TREATMENT OF SECOND-ORDER DIFFERENTIAL EQUATIONS,
AD-604 241 DIV. 15

NUMERICAL ANALYSIS
FUNCTIONS
ANALYTICAL APPROXIMATIONS OF HIGHER MATHEMATICAL FUNCTIONS,
AD-604 128 DIV. 15
ANALYTICAL APPROXIMATIONS OF HIGHER MATHEMATICAL FUNCTIONS,
AD-604 147 DIV. 15
ANALYTICAL APPROXIMATIONS OF PROBABILITY FUNCTIONS AND BESSEL FUNCTIONS,
AD-604 154 DIV. 15
ANALYTICAL APPROXIMATIONS OF PROBABILITY FUNCTIONS AND BESSEL FUNCTIONS,
AD-604 158 DIV. 15
APPROXIMATIONS IN NUMERICAL ANALYSIS; CHOICE OF PARAMETRIC FORM,
AD-604 232 DIV. 15

NUMERICAL ANALYSIS
INTEGRALS
ON APPROXIMATE EXPRESSIONS FOR THE EXPONENTIAL INTEGRAL AND THE ERROR FUNCTION,
AD-603 898 DIV. 15
ANALYTICAL APPROXIMATIONS OF CHI-SQUARE INTEGRALS,
AD-604 319 DIV. 15

NUMERICAL ANALYSIS
NUMERICAL METHODS AND PROCEDURES
ANALYTICAL APPROXIMATIONS OF A BESSEL FUNCTION, MACH NUMBERS, INTEGRALS, AND COSINE TRANSFORMATIONS,
AD-604 233 DIV. 15
ANALYTICAL APPROXIMATIONS OF A DEFINITE INTEGRAL, COSINE TRANSFORMATION BESSEL FUNCTION, MACH NUMBER, AND NATURAL LOGARITHM,
AD-604 243 DIV. 15

NUMERICAL ANALYSIS
POLYNOMIALS
APPLICATIONS OF VARIATION-DIMINISHING MATRICES; A GENERAL RULE OF SIGNS; STUDIES ON THE NEWTON-SYLVESTER THEOREM,
AD-603 781 DIV. 15

POLARIZATION
ELECTROMAGNETIC WAVES
STUDY AND INVESTIGATION OF POLARIZATION PROGRAMMING; POLARIZATION SYSTEMS ANALYSIS,
AD-603 624 DIV. 5

POLITICAL SCIENCE
CHINA
CHINA'S RELATIONS WITH ASIAN NEIGHBORS,
AD-603 674 DIV. 32

POLITICAL SCIENCE
COMMUNISM
A BOOK REVIEW OF SCHLESINGER'S 'MARX, HIS TIME AND OURS',
AD-603 906 DIV. 32

POLITICAL SCIENCE
GERMANY
GERMAN GEOPOLITICS REVIVED,
AD-604 311 DIV. 32

POLITICAL SCIENCE
PSYCHOLOGICAL WARFARE
SOME OBSERVATIONS ON THE ROLE OF RESEARCH IN POLITICAL WARFARE,
AD-603 979 DIV. 18

POLITICAL SCIENCE
USSR
POLITBURO IMAGES OF STALIN,
AD-603 888 DIV. 32

POLITICAL SCIENCE
WARFARE
ATTITUDES TOWARDS THE USE OF FORCE,
AD-604 165 DIV. 32

POLYAMIDE PLASTICS
VISCOELASTICITY
VISCOELASTIC PROPERTIES OF TWO HIGH-TEMPERATURE POLYMERS; H-FILM AND SP-POLYMER,
AD-604 010 DIV. 14

POLYNOMIALS
GAME THEORY
POLYNOMIAL GAMES; THEORY OF TWO-PERSON ZERO-SUM GAMES IN WHICH THE PAYOFF IS A POLYNOMIAL FUNCTION,
AD-603 834 DIV. 15

POLYNOMIALS
NUMERICAL ANALYSIS
APPLICATIONS OF VARIATION-DIMINISHING MATRICES; A GENERAL RULE OF SIGNS; STUDIES ON THE NEWTON-SYLVESTER THEOREM,
AD-603 781 DIV. 15
QUOTIENT-DIFFERENCE ALGORITHM AS A METHOD FOR FINDING THE ROOTS OF A POLYNOMIAL EQUATION WHEN ALL ROOTS ARE POSITIVE,
AD-604 012 DIV. 15

POLYNOMIALS
NUMERICAL METHODS AND PROCEDURES
NOTE ON THE USE OF CHEBYSHEV POLYNOMIALS FOR INTEGRATION OF ORDINARY DIFFERENTIAL EQUATIONS,
AD-603 740 DIV. 15

POPULATION
DISTRIBUTION (ECONOMICS)
EFFICIENCY ASPECTS OF DISPERSAL OF POPULATION AND INDUSTRY
AD-603 921 DIV. 18

POPULATION
USSR
TRENDS AND PROSPECTS OF THE SOVIET POPULATION AND LABOR FORCE,
AD-604 078 DIV. 23

POPULATION (MATHEMATICS)
SAMPLING
BEST CHOICE OF SAMPLE SIZE FOR A T-TEST WHEN THE RATIO OF VARIANCES IS KNOWN,
AD-604 063 DIV. 15

POPULATION (MATHEMATICS)
STATISTICAL TESTS
SOME NON-PARAMETRIC TESTS OF WHETHER THE LARGEST OBSERVATIONS OF A SET ARE TOO LARGE OR TOO SMALL,
AD-603 814 DIV. 15
GENERALIZATION OF THE BEHRENS-FISHER PROBLEM,
AD-603 836 DIV. 15
SOME TEST FOR COMPARING PERCENTAGE POINTS OF TWO ARBITRARY CONTINUOUS POPULATIONS,
AD-603 875 DIV. 15

PORPHYRINS
GERMANIUM COMPOUNDS
GERMANIUM MACROCYCLIC COMPLEXES BASED ON PHTHALOCYANINE AND HEMIPORPHYRAZINE
AD-604 117 DIV. 4

POSITION FINDING
PERFORMANCE TESTS
STUDIES COMPARING EFFECTIVENESS OF THREE-DIMENSIONAL VERSUS TWO-DIMENSIONAL PRESENTATIONS,
AD-604 017 DIV. 28

POSITION FINDING
TARGETS
EFFECT OF DIRECTION AND SPEED OF IMAGE MOTION UPON TARGET DETECTION WITH SIDE-LOOKING RADAR,
AD-603 598 DIV. 6

POTENTIOMETERS
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE FOR SUBMINIATURE, TRANSISTOR TYPE POTENTIOMETERS,
AD-603 943 DIV. 8

POTENTIOMETERS
PLASTICS
CONDUCTIVE PLASTICS IN ANALOG COMPUTING,
AD-604 209 DIV. 30

POWER AMPLIFIERS
PULSE AMPLIFIERS
HIGH SPEED POWER AMPLIFIER USING ELECTRON BEAM SWITCHED P-N JUNCTIONS,
AD-604 115 DIV. 8

POWER AMPLIFIERS
TRANSISTORS
PRODUCTION ENGINEERING MEASURE ON 300 MW -400 MC POWER TRANSISTOR,
AD-603 941 DIV. 8
PRODUCTION ENGINEERING MEASURE ON 300 MW -400 MC POWER TRANSISTOR INSPECTION AND QUALITY CONTROL PLAN,
AD-603 942 DIV. 8

POWER METERS
MILLIMETER WAVES
FREQUENCY SELECTIVE POWER METER FOR MILLIMETER WAVES,
AD-604 021 DIV. 8

POWER REACTORS
REACTOR FEASIBILITY STUDIES
A FEASIBILITY STUDY OF A HIGH-TEMPERATURE, LIQUID ALUMINUM COOLED, FLUIDIZED BED NUCLEAR POWER REACTOR,
AD-603 610 DIV. 20

POWER SERIES
ITERATIVE METHODS
ITERATION OF POWER SERIES IN TWO VARIABLES,
AD-603 926 DIV. 15

POWER SERIES
NUMERICAL METHODS AND PROCEDURES
PERTURBATION METHODS INVOLVING EXPANSIONS IN TERMS OF A PARAMETER,
AD-604 288 DIV. 15

POWER SUPPLIES
ELECTROSTATIC GENERATORS
ELECTROSTATIC POWER GENERATOR,
AD-603 643 DIV. 7

PRESSURE SUITS
EXPOSURE SUITS
X-20A FULL-PRESSURE SUIT QUANTITATIVE PERFORMANCE,
AD-603 701 DIV. 14

PRESSURE VESSELS
MANUFACTURING METHODS
DESIGN, PERFORMANCE, FABRICATION, AND MATERIAL CONSIDERATIONS FOR HIGH-PRESSURE VESSELS,
AD-603 694 DIV. 26

PROBABILITY
DISTRIBUTION THEORY
SIMPLE DERIVATION OF THE POISSON DISTRIBUTION,
AD-604 222 DIV. 15

PROBABILITY
HAZARDS
BOUNDS ON DENSITIES AND HAZARD RATES,
AD-603 538 DIV. 15

PROBABILITY
NUMBERS
SOME TESTS OF THE RANDOMNESS OF A MILLION DIGITS,
AD-603 808 DIV. 15
HISTORY OF RAND'S RANDOM DIGITS, SUMMARY,
AD-603 841 DIV. 15

PROBABILITY
SIGNAL-TO-NOISE RATIO
APPLICATIONS OF THE KAC-SIEGERT METHOD FOR FINDING OUTPUT PROBABILITY DENSITIES FOR RECEIVERS WITH SQUARE LAW DETECTORS,
AD-604 083 DIV. 8

PROBABILITY
STATISTICAL ANALYSIS
A TALE OF PROBABLE REGIONS (A STATISTICAL ALLEGORY),
AD-603 974 DIV. 15

PRODUCTION CONTROL
TRANSISTORS
PRODUCTION ENGINEERING MEASURE ON 300 MW -400 MC POWER TRANSISTOR INSPECTION AND QUALITY CONTROL PLAN,
AD-603 942 DIV. 8

PROGRAMMERS
PERSONNEL MANAGEMENT
A NOTE CONCERNING THE ORGANIZATION OF AN IBM 701 INSTALLATION,
AD-604 314 DIV. 23

PROGRAMMING LANGUAGES
PUNCHED CARDS
EXTERNAL AND INTERNAL PROGRAM SETUP (EIP) FOR IBM MODEL 11 CPC,
AD-604 224 DIV. 30
EXTERNAL AND INTERNAL PROGRAM SETUP (EIP) FOR IBM MODEL 11 CPC,
AD-604 225 DIV. 30

PROGRAMMING (COMPUTERS)
ANTENNA CONFIGURATIONS
DIGITAL COMPUTER DESIGN OF THE DIPOLE PARAMETRIC AMPLIFIER ANTENNA,
AD-604 171 DIV. 8

PROGRAMMING (COMPUTERS)
ATMOSPHERE
COMPUTER SOLUTION OF TRANSIENT AND QUASI-EQUILIBRIUM ATMOSPHERIC DEIONIZATION EQUATIONS,
AD-604 069 DIV. 2

PROGRAMMING (COMPUTERS)
CHEMOTHERAPY
THREE-ORGAN DRUG DISTRIBUTION MODEL INCLUDING THE KIDNEY,
AD-603 675 DIV. 16

PROGRAMMING (COMPUTERS)
COSTS
FACTORS THAT AFFECT THE COST OF COMPUTER PROGRAMMING,
AD-603 707 DIV. 30

PROGRAMMING (COMPUTERS)
INFORMATION RETRIEVAL
FACT CORRELATION AS A MEANS OF TEXT REORGANIZATION FOR INFORMATION RETRIEVAL,
AD-603 697 DIV. 30

PROGRAMMING (COMPUTERS)
OPERATION
MATRIX INVERSION ON AN AUTOMATIC CALCULATOR BY ROW AND COLUMN PARTITIONING,
AD-604 226 DIV. 30

PROGRAMMING (COMPUTERS)
TEST METHODS
COMPUTER PROGRAMS FOR HAYSTACK SERVO TESTING,
AD-603 794 DIV. 8

PROGRAMMING (COMPUTERS)
URBAN PLANNING
COMPUTER MODEL OF THE SPATIAL ORGANIZATION OF HUMAN ACTIVITIES WITHIN A METROPOLITAN AREA,
AD-603 670 DIV. 2

PROPAGANDA
COMMUNICATION THEORY
SYSTEM APPROACH TO PERSUASIVE COMMUNICATIONS,
AD-603 721 DIV. 18
METHODOLOGY FOR COMMUNICATIONS RESEARCH,
AD-603 923 DIV. 18

PROPAGANDA
SOCIAL COMMUNICATION
TOTALITARIAN COMMUNICATIONS AS A MEANS OF CONTROL, A NOTE ON THE SOCIOLOGY OF PROPAGANDA,
AD-603 879 DIV. 18

PROPAGANDA
USSR
SOVIET IMAGE OF THE U. S.,
AD-604 227 DIV. 32

PROPELLANT GRAINS
BURNING RATE
FORM FUNCTIONS FOR DUAL COMPOSITION INCREMENTS OF PROPELLANT GRAINS,
AD-603 520 DIV. 10

PROPELLER BLADES
AERODYNAMIC LOADING
TESTS OF A HAMILTON STANDARD FOUR-WAY 21-INCH-DIAMETER MODEL PROPELLER EMPLOYING THE U. S. NAVY AIRBORNE MODEL TEST FACILITY,
AD-603 791 DIV. 1

PROPELLERS (AERIAL)
MODEL TESTS
TESTS OF A HAMILTON STANDARD FOUR-WAY 21-INCH-DIAMETER MODEL PROPELLER EMPLOYING

PANELS (STRUCTURAL)
STRUCTURAL SHELLS
FREQUENCY EFFECTS IN
PANEL FLUTTER OF CYLINDRICAL
SHELLS,
AD-603 941 DIV. 9

PARACHUTES
AERODYNAMIC CHARACTERISTICS
THEORETICAL PARACHUTE
INVESTIGATIONS; BEHAVIOR
AT SUBSONIC AND SUPERSONIC
SPEEDS,
AD-603 723 DIV. 9

PARTIAL DIFFERENTIAL EQUATIONS
DIFFUSION
CONVERGENCE OF A PROCEDURE
OF DUFORT AND FRANKEL
FOR THE NUMERICAL SOLUTION
OF PARABOLIC DIFFERENTIAL
EQUATIONS,
AD-604 308 DIV. 15

PARTIAL DIFFERENTIAL EQUATIONS
NUMERICAL ANALYSIS
ON THE CRANK-NICOLSON
PROCEDURE FOR SOLVING
PARABOLIC PARTIAL DIFFERENTIAL
EQUATIONS,
AD-604 289 DIV. 15

PARTIAL DIFFERENTIAL EQUATIONS
STOCHASTIC PROCESSES
PARTIAL DIFFERENTIAL
EQUATIONS FOR DENSITIES
OF RANDOM PROCESSES,
AD-604 005 DIV. 15

PARTICLE TRAJECTORIES
ELECTRONS
TABLES OF NON-RELATIVISTIC
ELECTRON TRAJECTORIES
FOR FIELD EMISSION CATHODES,
AD-604 256 DIV. 8

PASSIVE DEFENSE
ECONOMICS
COMPENSATION FOR WAR
DAMAGE: AN ECONOMIC
VIEW,
AD-604 320 DIV. 18
WAR DAMAGE INSURANCE,
AD-604 321 DIV. 18

PERCEPTION (PSYCHOLOGY)
LEADERSHIP
PERCEPTION OF LEADERSHIP
IN SMALL GROUPS: A
RANK ORDER INVESTIGATION
OF THE EMERGENCE OF
THE LEADERSHIP ROLE
IN SMALL GROUPS,
AD-603 793 DIV. 28

PERCEPTION (PSYCHOLOGY)
MOTIVATION
SOCIAL INFLUENCE, INFORMATION
PROCESSING, AND NET
CONFORMITY IN DYADS,
AD-603 554 DIV. 28

PERFORMANCE TESTS
TIME STUDIES
OPERATOR PERFORMANCE
STUDIES: LEARNING ANALYSIS
FROM THREE-PLANE MOTIONS,
AD-603 528 DIV. 28

ERFORMANCE (HUMAN)
NAVAL PERSONNEL
BODY SIZE, SELF EVALUATION,
AND MILITARY EFFECTIVENESS,
AD-603 578 DIV. 28

PERSONAL MANAGEMENT
PSYCHOMETRICS
VALIDITY OF AGE, EDUCATION,
AND GCT SCORE AS PREDICTORS
OF TWO-YEAR ATTRITION
AMONG NAVAL ENLISTEES,
AD-603 579 DIV. 23

PERSONALITY
LEADERSHIP
SOME EFFECTS OF LEADERSHIP
TRAINING ON INTERCULTURAL
DISCUSSION GROUPS,
AD-603 948 DIV. 28

PERSONALITY
NAVAL PERSONNEL
BODY SIZE, SELF EVALUATION,
AND MILITARY EFFECTIVENESS,
AD-603 578 DIV. 28

PERSONNEL MANAGEMENT
DECISION THEORY
FORMAL THEORY OF THE
EMPLOYMENT RELATIONSHIP,
AD-603 913 DIV. 23

PERSONNEL MANAGEMENT
PSYCHOMETRICS
PRACTICAL VALUE OF
A PSYCHIATRIC SCREENING
INTERVIEW IN PREDICTING
MILITARY INEFFECTIVENESS,
AD-603 577 DIV. 23

PETROLEUM INDUSTRY
ECONOMICS
PETROLEUM REFINERY OPERATIONS
SCHEDULING, CHAPTER
II, CONVENTIONAL METHODS
OF REFINERY ECONOMIC
ANALYSIS,
AD-604 298 DIV. 26
PETROLEUM REFINERY OPERATIONS
SCHEDULING, CHAPTER
IV, A NAPHTHA REFORMING
PROBLEM,
AD-604 304 DIV. 26

PETROLEUM INDUSTRY
SCHEDULING
PETROLEUM REFINERY OPERATIONS
SCHEDULING, CHAPTER
III, A CRUDE OIL ALLOCATION
PROBLEM,
AD-604 301 DIV. 26
PETROLEUM REFINERY OPERATIONS
SCHEDULING, CHAPTER
V, A GASOLINE BLENDING
PROBLEM,
AD-604 302 DIV. 26
PETROLEUM REFINERY OPERATIONS
SCHEDULING, CHAP. VI,
CRACKING, RECYCLING,
AND BLENDING -AN INTEGRATED
REFINERY PROBLEM,
AD-604 309 DIV. 26
PETROLEUM REFINERY OPERATIONS
SCHEDULING, CHAP. I,
INTRODUCTION
AD-604 312 DIV. 26
PETROLEUM REFINERY OPERATIONS
SCHEDULING, CHAP. VII,
THE ECONOMIST AND
THE OPERATIONS SCHEDULER,
AD-604 313 DIV. 26

PHARMACOLOGY
CIVIL DEFENSE
THE ROLE OF THE PHARMACIST
IN NATIONAL DISASTER,
AD-604 275 DIV. 16

PHASE SHIFT
ELECTROMAGNETIC PULSES
CALCULATION OF INTRA-PULSE
PHASE SHIFT IN LINEAR
BEAM MICROWAVE TUBES,
AD-603 712 DIV. 8

PHASE SHIFTERS
WAVEGUIDES
MICROWAVE INTERACTIONS
IN SEMICONDUCTORS; DISTRIBUTED
SINGLE CRYSTAL STRUCTURES;
SOLID STATE ULTRASONIC
AMPLIFIERS AND TRANSDUCERS,
AD-603 521 DIV. 8

PHOTOCHEMISTRY
ORGANIC NITROGEN COMPOUNDS
HIGH INTENSITY PHOTOLYSIS
OF AZO COMPOUNDS AT
3600 A,
AD-603 679 DIV. 4

PHOTOCHEMISTRY
SYMPOSIA
ABSTRACTS OF PAPERS
PRESENTED AT A PHOTOCHEMISTRY
CONFERENCE,
AD-603 537 DIV. 4

PHOTOCHEMISTRY
WATER
PHOTOCATALYZED DECOMPOSITION
OF WATER: INTRAMOLECULAR
ELECTRON TRANSFER IN
ORGANIC COMPOUNDS,
AD-603 728 DIV. 4

PHOTOENGRAVING
INTEGRATED CIRCUITS
INTEGRATED SILICON DEVICE
TECHNOLOGY, VOLUME III,
PHOTOENGRAVING,
AD-603 715 DIV. 25

PHOTOGRAMMETRY
DIGITAL SYSTEMS
OPTIMIZED DIGITAL AUTOMATIC
MAP COMPILATION SYSTEM,
AD-603 861 DIV. 2

PHOTOGRAPHS
CLOUD COVER
EVALUATION OF ERRORS
IN THE GRAPHICAL RECTIFICATION
OF SATELLITE PHOTOGRAPHS,
AD-603 574 DIV. 2

PHOTOPERIODISM
TESTES
INVESTIGATION OF THE
MECHANISM OF THE CARRY-OVER
PERIOD IN THE PHOTOPERIODIC
GONADAL RESPONSE IN
BIRDS,
AD-603 562 DIV. 16

PHTHALOCYANINES
GERMANIUM COMPOUNDS
GERMANIUM MACROCYCLIC
COMPLEXES BASED ON
PHTHALOCYANINE AND HEMIPORPHYRAZINE
AD-604 117 DIV. 4

PHTHALOCYANINES
SILICON COMPOUNDS
SYNTHESIS, PURIFICATION,
AND HYDROLYSIS OF DICHLORO(PHTHALO-
CYANINO)SILICON,
AD-604 118 DIV. 4

PIEZOELECTRIC CRYSTALS
ELECTRICAL PROPERTIES
ACOUSTIC AMPLIFICATION
AND ELECTRON MOBILITY
IN LITHIUM AND SODIUM
DOPED CADMIUM SULFIDE,
AD-603 611 DIV. 25

PIPES
ACOUSTIC PROPERTIES
FLOW NOISE STUDY OF
WATER FLOWING THROUGH
PIPES,
AD-603 589 DIV. 9

PLANETS
BIBLIOGRAPHIES
BIBLIOGRAPHY OF EXTRATERRESTRIAL
RESEARCH,
AD-604 105 DIV. 2

PLASMA MEDIA
CHARGED PARTICLES
CHARGED PARTICLE MOTION
IN AN INHOMOGENEOUS
MAGNETIC FIELD,
AD-603 402 DIV. 25

PLASMA MEDIA
EMISSIVITY
RADIAL EMISSION COEFFICIENT
AND RADIAL TEMPERATURE
PROFILES OF A CYLINDRICALLY
SYMMETRIC OPTICALLY THICK
PLASMA,
AD-603 600 DIV. 25

PLASMA MEDIUM
ANALYSIS
OPTICAL SCATTERING AS
A TECHNIQUE FOR PLASMA
DIAGNOSTICS,
AD-603 738 DIV. 25

PLASMA MEDIUM
COOLING
THERMAL AND ELECTRICAL
CONDUCTIVITY OF COOLING
STELLAR PLASMA EMITTING
NEUTRINOS,
AD-603 868 DIV. 2

PLASMA MEDIUM
ELECTROMAGNETIC WAVES
INTERACTION OF ELECTROMAGNETIC
WAVES AND CLASSICAL
PLASMAS,
AD-603 523 DIV. 25

PLASMA MEDIUM
EXOSPHERE
DISTRIBUTION OF IONS
AND ELECTRONS IN THE
EARTH'S EXOSPHERE,
AD-604 040 DIV. 2

PLASMA MEDIUM
PROBES (ELECTROMAGNETIC)
APPLICATION OF LANGMUIR
PROBE TECHNIQUES TO
FLOWING IONIZED GASES,
AD-603 668 DIV. 9

PLASMA MEDIUM
SCATTERING
THOMSON SCATTERING COMPUTATIONS
FOR LABORATORY PLASMAS,
AD-603 950 DIV. 25

PLASMA MEDIUM
TEMPERATURE
DETERMINATION OF THE
TEMPERATURE PROFILE OF
AN OPTICALLY THICK CYLINDRICALLY
SYMMETRIC LABORATORY
PLASMA,
AD-603 685 DIV. 25

PLASMA OSCILLATIONS
ENERGY CONVERSION
PLASMA KINETIC ENERGY-MICROWAVE
CONVERSION,
AD-604 120 DIV. 8

PLASMA OSCILLATIONS
MILLIMETER WAVES
MILLIMETER WAVE GENERATION
BY PLASMA,
AD-604 088 DIV. 25

PLASMA OSCILLATIONS
RESONANCE
PLASMA WAVE RESONANCES
IN A HOT NONUNIFORM
PLASMA COLUMN,
AD-603 533 DIV. 25
THEORY OF PLASMA WAVE
RESONANCES IN A HOT
NONUNIFORM PLASMA,
AD-603 534 DIV. 25
NANOSECOND-PULSE BREAKDOWN
STUDY OF GASES AT
MICROWAVE FREQUENCIES,
AD-603 818 DIV. 25

PLASMA PHYSICS
MECHANICAL WAVES
REVIEW OF PLASMA WAVE
PHENOMENA,
AD-603 901 DIV. 25

PLASMA SHEATH
SPACE CHARGES
PROPAGATION OF NONLINEAR
HAHN-RAMO WAVES ALONG
AN ANNULAR ELECTRON CURRENT
SHEATH,
AD-603 572 DIV. 8

PLASTIC COATINGS
HALOCARBON PLASTICS
DEVELOPMENT AND EVALUATION
OF HEAT-RESISTANT, RAIN-EROSION
-RESISTANT COATINGS,
AD-604 023 DIV. 14

PLASTICITY
TITANIUM ALLOYS
DEFORMATION PROCESSING
OF ANISOTROPIC METALS:
TITANIUM ALLOY 4 AL-1/4O2
AD-603 637 DIV. 17

PLASTICS
CONDUCTIVITY
CONDUCTIVE PLASTICS IN
ANALOG COMPUTING,
AD-604 209 DIV. 30

RADIOFREQUENCY INTERFERENCE
ELECTRONIC EQUIPMENT
INTERFERENCE CONSIDERATIONS
IN TERMINAL EQUIPMENT
DESIGN,
AD-603 866 DIV. 8

RADIOFREQUENCY INTERFERENCE
RADAR EQUIPMENT
INTERFERENCE CONSIDERATIONS
IN RADAR DESIGN,
AD-603 867 DIV. 8

RADIOFREQUENCY INTERFERENCE
RADIO RECEIVERS
REFERENCE TEXT ON RADIO
FREQUENCY INTERFERENCE
CONSIDERATIONS IN RECEIVER
DESIGN,
AD-603 792 DIV. 8

RADIOFREQUENCY INTERFERENCE
RADIO TRANSMITTERS
INTERFERENCE CONSIDERATIONS
IN TRANSMITTER DESIGN,
AD-603 847 DIV. 8

RADIOFREQUENCY INTERFERENCE
SWITCHING CIRCUITS
REFERENCE TEXT ON MISCELLANEOUS
RADIOFREQUENCY INTERFERENCE
CONSIDERATIONS IN SWITCHING
CIRCUITS DESIGN,
AD-603 859 DIV. 8

RADIOGRAPHY
COLOR PHOTOGRAPHY
EVALUATION OF COLOR
RADIOGRAPHY FOR INDUSTRIAL
USE: I THE REEXPOSURE
METHOD,
AD-603 633 DIV. 24

RADIOLOGICAL CONTAMINATION
CIVIL DEFENSE SYSTEMS
A PROTOTYPE CIVIL DEFENSE
MANUAL FOR RADIOLOGICAL
DECONTAMINATION OF MUNICIPALITIES,
VOLUME I, DECONTAMINATION
PLANNING,
AD-603 641 DIV. 18

RADIOMETERS
MILLIMETER WAVES
FREQUENCY SELECTIVE POWER
METER FOR MILLIMETER
WAVES,
AD-604 021 DIV. 8

RADIOPROTECTIVE AGENTS
BIOCHEMISTRY
EFFECTS OF IONIZING
RADIATION ON MAMMALIAN
BIOCHEMISTRY: PROTECTIVE
AND THERAPEUTIC AGENTS
AGAINST RADIATION INJURY:
INFLUENCE OF GAMMA AND
FAST NEUTRON IRRADIATION
ON LIFE SPAN,
AD-603 581 DIV. 16

RADOMES
HIGH-TEMPERATURE RESEARCH
DEVELOPMENT OF A 1200F
RADOME, THERMAL AND
PHYSICAL PROPERTIES OF
CERAMIC MATRICES AND
GLASS REINFORCED LAMINATES,
AD-603 730 DIV. 8

RAILROADS
ECONOMICS
ALLOCATION OF SWITCHING
WORK IN A SYSTEM
OF RAILROAD CLASSIFICATION
YARDS,
AD-604 246 DIV. 33

RAILROADS
MANPOWER STUDIES
EMPLOYMENT AND LABOR
PRODUCTIVITY IN USSR
RAILROADS, 1928-1950,
AD-604 144 DIV. 23

RAMAN SPECTROSCOPY
CRYSTALS
CRYOGENIC METHOD FOR
RAMAN STUDIES OF MOLECULAR
CRYSTALS,
AD-604 273 DIV. 25

RARE EARTH ELEMENTS
FERROMAGNETIC MATERIALS
MAGNETIC PROPERTIES OF
RARE EARTH-IRON ALLOYS,
AD-603 612 DIV. 17

REACTOR SYSTEM COMPONENTS
CRYOSTATS
DESIGN OF A CRYOSTAT
FOR THE AIR FORCE
NUCLEAR ENGINEERING TEST
FACILITY,
AD-603 609 DIV. 20

REACTOR THEORY
GRAPHITE MODERATED REACTORS
NUCLEAR ANALYSIS OF
GASEOUS CORE REACTORS
USING AN APPROXIMATE
MULTI-GROUP TRANSPORT
THEORY TECHNIQUE,
AD-603 683 DIV. 20

REAL VARIABLES
FUNCTIONS
POLYNOMIAL-LIKE APPROXIMATION,
AD-604 142 DIV. 15

RECTIFIERS (PHOTOGRAPHY)
GRAPHICS
EVALUATION OF ERRORS
IN THE GRAPHICAL RECTIFICATION
OF SATELLITE PHOTOGRAPHS,
AD-603 574 DIV. 2

REENTRY VEHICLES
ABANDONMENT
INVESTIGATION OF LOCATION
AND RETRIEVAL CRITERIA
FOR RE-ENTRY CREW ESCAPE
SYSTEMS,
AD-603 759 DIV. 12

REENTRY VEHICLES
SIMULATION
RE-ENTRY VEHICLE SIMULATION
DESIGNED FOR THE STUDY
OF GROUND SYSTEM REQUIREMENTS,
AD-603 714 DIV. 12

REFLECTORS
ANTENNA FEEDS
TRANSVERSE FOCAL REGION
OF A SPHERICAL REFLECTOR:
PART II GEOMETRIC OPTICS,
AD-603 788 DIV. 8

REFLECTORS
FOILS
EXPLORATORY PREPARATION
OF FOILS STRONGLY COLORED
IN THE 1 -6 MICRON
REGION OF THE INFRARED,
AD-604 009 DIV. 14

REFLEXES
BIONICS
MODEL OF THE INTRA-AURAL
REFLEX,
AD-603 955 DIV. 30

REFLEXES
REACTION (PSYCHOLOGY)
DEVICES FOR INDICATING
ALERTNESS,
AD-604 070 DIV. 16

REFRACTION
IONOSPHERE
NEW METHOD FOR EXPLORING
THE UPPER IONOSPHERE,
AD-603 797 DIV. 2

REFRACTORY MATERIALS
THERMODYNAMICS
THERMODYNAMIC FUNCTIONS OF
HAFNIUM HALIDES,
AD-603 662 DIV. 4

REFRACTORY METALS
HOT WORKING
HOT WORKING EVALUATION
OF REFRACTORY AND REACTIVE
METALS,
AD-603 779 DIV. 17

REFRACTORY METALS
SURFACE PROPERTIES
STUDY OF CESIUM ON
REFRACTORY METALS USING
FIELD EMISSION MICROSCOPY,
AD-603 902 DIV. 17

REINFORCING MATERIALS
FIBERS
FIBER-REINFORCED METALS
AND ALLOYS,
AD-604 190 DIV. 17

RELATIVITY THEORY
ATOMIC STRUCTURE
RESOLUTION OF CONVERGENCE
DIFFICULTIES IN THE
THOMAS-FERMI ATOM MODEL,
AD-604 310 DIV. 25

RELAXATION OSCILLATORS
TRANSISTORS
COMMON-EMITTER BLOCKING
OSCILLATOR OF STABLE
DURATION,
AD-603 786 DIV. 8

RELAYS
RADIOFREQUENCY INTERFERENCE
INTERFERENCE STUDIES,
INVESTIGATIONS, AND TESTS
CONCERNING ELECTRIC ARC-PRODUCING
DEVICES INCLUDING ELECTROMAGNET-
IC RELAYS, SOLID STATE
SWITCHING CIRCUITS AND
GERMICIDAL LAMPS,
AD-603 933 DIV. 8

RENDEZVOUS SPACECRAFT
REMOTE CONTROL SYSTEMS
DESIGN OF A CONSTANT
ATTITUDE TARGET FOR
RENDEZVOUS WITH REMOTE
MANEUVERING UNIT,
AD-603 617 DIV. 6

RENDEZVOUS TRAJECTORIES
ORBITAL TRAJECTORIES
TIME HISTORY AS AN
INFORMATION SOURCE FOR
OPERATOR CONTROL OF ORBITAL
RENDEZVOUS,
AD-603 597 DIV. 23

REPORTS
AIR FORCE RESEARCH
A BRIEF SYNOPSIS OF
IN-HOUSE RESEARCH,
AD-604 007 DIV. 25

REPORTS
SCIENTIFIC RESEARCH
QUARTERLY PROGRESS REPORT
NO. 74, RADIO PHYSICS,
PLASMA DYNAMICS, AND
COMMUNICATION SCIENCES
AND ENGINEERING,
AD-603 870 DIV. 30

RESEARCH PROGRAM ADMINISTRATION
ELECTRONICS
RESEARCH AND DEVELOPMENT
IN THE CHICAGO AREA
ELECTRONICS INDUSTRY,
AD-603 732 DIV. 30

RESISTORS
MANUFACTURING METHODS
PRODUCTION ENGINEERING
MEASURE FOR RESISTOR-CAPACITOR
MICROELEMENTS FOR MICROMODULES,
AD-604 119 DIV. 8

RESONATORS
PLASMA MEDIUM
FREE AND DRIVEN MODES
IN ANISOTROPIC PLASMA
GUIDES AND RESONATORS,
AD-604 087 DIV. 8

RETRAINING
PERSONNEL MANAGEMENT
RETRAINING AND LABOR
MARKET ADJUSTMENT IN
WESTERN EUROPE,
AD-603 647 DIV. 23

REYNOLDS NUMBER
BASE FLOW
BASE FLOW PROBLEM AT
VERY LOW REYNOLDS NUMBER
IN THE STOKES APPROXIMATION,
AD-603 669 DIV. 9

RIVETED JOINTS
STRESSES
EFFECT OF A RIVETED
STRINGER ON THE STRESS
IN A SHEET WITH A
CRACK OR A CUTOUT,
AD-603 693 DIV. 25

ROCKET IGNITERS
HEAT TRANSFER
HEAT TRANSFER OF HOT
NITROGEN IGNITION IN
ROCKET IGNITERS,
AD-603 814 DIV. 10

ROCKET MOTORS (LIQUID PROPELLANT)
PERFORMANCE (ENGINEERING)
TRANSLATION OF POLISH
RESEARCH: DETERMINATION
OF OPTIMUM CHITICAL OPERATING
PARAMETERS FOR A NONISOBARIC
ROCKET MOTOR WITH A
DIVERGENT NOZZLE,
AD-603 947 DIV. 27

ROCKET PROPELLANTS
PROPELLANT GRAINS
FORM FUNCTIONS FOR
DUAL COMPOSITION INCREMENTS
OF PROPELLANT GRAINS,
AD-603 520 DIV. 10

ROLLING (METALLURGY)
TANTALUM ALLOYS
PILOT PRODUCTION AND EVALUATION
OF TANTALUM ALLOY SHEET,
AD-604 173 DIV. 17

ROTARY SEALS
SPACE PROPULSION
DYNAMIC SHAFT SEALS
IN SPACE,
AD-603 655 DIV. 27

ROTOR BLADES (ROTARY WINGS)
DESIGN
INVESTIGATION OF ELASTIC
COUPLING PHENOMENA OF
HIGH SPEED RIGID ROTOR
SYSTEMS,
AD-604 030 DIV. 1

RUBY
LASERS
MICROWAVE-OPTICAL EXPERIMENTS
AND PSEUDO-STARK EFFECT
IN RUBY,
AD-603 649 DIV. 25

SAMPLING
ANALYSIS OF VARIANCE
BEST CHOICE OF SAMPLE
SIZE FOR A T-TEST
WHEN THE RATIO OF
VARIANCES IS KNOWN,
AD-604 063 DIV. 15

SAMPLING
CORRELATION TECHNIQUES
CONCERNING THE EFFECT OF
SMALL CORRELATION ON CERTAIN
LARGE SAMPLE TESTS AND CONFIDENCE
INTERVALS FOR THE MEAN,
AD-603 840 DIV. 15

SAMPLING
NOISE
EVALUATION F NOISE
SAMPLES: STATISTICAL
PROPERTIES OF GAUSSIAN
NOISE,
AD-603 984 DIV. 8

SAMPLING
NUMBERS
SOME TESTS OF THE
RANDOMNESS OF A MILLION
DIGITS,
AD-603 808 DIV. 15

SAMPLING
STATISTICAL TESTS
LARGE SAMPLE TESTS
AND CONFIDENCE INTERVALS
FOR MORTALITY RATES,
AD-603 828 DIV. 15
LARGE SAMPLE T-STATISTIC

THE U. S. NAVY AIRBORNE MODEL TEST FACILITY,
AD-603 791 DIV. 1

PSYCHOACOUSTICS
THRESHOLDS (PHYSIOLOGY)
BINAURAL INTERACTION,
AD-603 766 DIV. 28

PSYCHOLOGICAL WARFARE
OPERATIONS RESEARCH
SYSTEM APPROACH TO PERSUASIVE COMMUNICATIONS,
AD-603 721 DIV. 18

PSYCHOLOGICAL WARFARE
POLITICAL SCIENCE
PSYCHOLOGICAL WARFARE RECONSIDERED,
AD-603 909 DIV. 18

PSYCHOLOGICAL WARFARE
THEORY
SOME OBSERVATIONS ON THE ROLE OF RESEARCH IN POLITICAL WARFARE,
AD-603 979 DIV. 18

PSYCHOMETRICS
NAVAL PERSONNEL
BODY SIZE, SELF EVALUATION, AND MILITARY EFFECTIVENESS,
AD-603 578 DIV. 28

PSYCHOMETRICS
STATISTICAL ANALYSIS
MAXIMUM LIKELIHOOD SOLUTION FOR PAIRED COMPARISONS
SCALINGS BY THURSTONE'S CASE V, MAXIMUM LIKELIHOOD SOLUTION FOR SUCCESSIVE INTERVALS SCALING,
AD-604 279 DIV. 28

PSYCHOMOTOR TESTS
PSYCHOPHYSIOLOGY
FACTORIAL ANALYSIS OF PRECISION, STEADINESS AND EQUILIBRIUM IN FINE MOTOR SKILLS,
AD-603 763 DIV. 28

PSYCHOPHYSIOLOGY
GALVANIC SKIN RESPONSE
AN ASSESSMENT OF LIE DETECTION CAPABILITY (DECLASSIFIED VERSION),
AD-603 840 DIV. 30

PUBLIC OPINION
CONTROL
TOTALITARIAN COMMUNICATIONS AS A MEANS OF CONTROL, A NOTE ON THE SOCIOLOGY OF PROPAGANDA,
AD-603 879 DIV. 18

PUBLIC OPINION
UNITED NATIONS
THE LESSER EVIL: UN INTERVENTION IN KOREA,
AD-603 908 DIV. 32

PULSE AMPLIFIERS
DIODES (SEMICONDUCTOR)
HIGH SPEED POWER AMPLIFIER USING ELECTRON BEAM SWITCHED P-N JUNCTIONS,
AD-604 115 DIV. 8

PULSE COMPRESSION
GAS DISCHARGES
NANOSECOND-PULSE BREAKDOWN STUDY OF GASES AT MICROWAVE FREQUENCIES,
AD-603 818 DIV. 25

PULSEJET ENGINES
RESEARCH PROGRAM ADMINISTRATION
SUMMARY REPORT ON INVESTIGATION OF MINIATURE VALVELESS PULSE JETS,
AD-604 028 DIV. 27

PUMPS
LIQUEFIED GASES
INVESTIGATION, DESIGN, AND TEST OF EXPERIMENTAL LIQUID HYDROGEN PUMPS,
AD-603 548 DIV. 12

PUNCHED CARDS
PROGRAMMING (COMPUTERS)
EXTERNAL AND INTERNAL PROGRAM SETUP (EIP) FOR IBM MODEL II CPC,
AD-604 224 DIV. 30
EXTERNAL AND INTERNAL PROGRAM SETUP (EIP) FOR IBM MODEL II CPC,
AD-604 225 DIV. 30

PYROLYSIS
NITROGEN COMPOUNDS
CONSTANT PRESSURE DECOMPOSITION OF NITROUS OXIDE, N2O + .68N2, AND N2O + AIR MIXTURES AT 11.2 ATM, AND INITIAL TEMPERATURES FROM 722K TO 1233K,
AD-603 620 DIV. 4

QUALITY CONTROL
INDUSTRIAL PRODUCTION
SAMPLING INSPECTION PLANS FOR CONTINUOUS PRODUCTION,
AD-603 801 DIV. 26

QUALITY CONTROL
STATISTICAL ANALYSIS
THE FUTURE OF MATHEMATICAL STATISTICS AND QUALITY CONTROL,
AD-603 833 DIV. 32

QUANTUM MECHANICS
HYDROGEN
BENTZEL, KRAMERS, BRILLOUIN APPROXIMATION THROUGH THE TURNING POINT,
AD-604 303 DIV. 25

QUANTUM MECHANICS
MATHEMATICAL MODELS
MEASUREMENT OF A QUANTUM ENSEMBLE BY A CLASSICAL APPARATUS,
AD-603 719 DIV. 25

QUANTUM STATISTICS
BOSONS
STATISTICAL DESCRIPTIONS OF FREE BOSON FIELDS,
AD-603 619 DIV. 25

QUARTZ RESONATORS
AGING (MATERIALS)
QUARTZ CRYSTAL AGING EFFECTS,
AD-604 269 DIV. 8

RADAR EQUIPMENT
DISPLAY SYSTEMS
FOUR-FREQUENCY RADAR MASTER CONSOLE,
AD-603 858 DIV. 6

RADAR EQUIPMENT
RADIOFREQUENCY INTERFERENCE
INTERFERENCE CONSIDERATIONS IN RADAR DESIGN,
AD-603 867 DIV. 8

RADAR IMAGES
SIDE-LOOKING RADAR
EFFECT OF DIRECTION AND SPEED OF IMAGE MOTION UPON TARGET DETECTION WITH SIDE-LOOKING RADAR,
AD-603 598 DIV. 6

RADAR INTERFERENCE
MEASUREMENT
RADAR EQUIPMENT INTERFERENCE CHARACTERISTICS,
AD-603 639 DIV. 6

RADAR INTERFERENCE
OPERATIONS RESEARCH
APPLICATION OF OPERATIONS RESEARCH TO INTERFERENCE,
AD-604 068 DIV. 8

RADIATION CHEMISTRY
ALIPHATIC COMPOUNDS
RADIOLYSIS OF PROPANE AT LOW CONVERSION,
AD-603 605 DIV. 4

RADIATION DAMAGE
ACETYL PLASTICS
NUCLEAR RADIATION EFFECTS ON THE MECHANICAL PROPERTIES OF ACETAL RESINS DELRIN AND CELCON,
AD-604 016 DIV. 14

RADIATION DAMAGE
ELECTROMAGNETIC WAVES
EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF RADIATION OF THE PROPAGATION OF ELECTROMAGNETIC SIGNALS IN AIR,
AD-603 770 DIV. 20

RADIATION DAMAGE
ELECTRONIC EQUIPMENT
DOSIMETRY SYSTEM FOR THE FLASH X-RAY,
AD-603 608 DIV. 20

RADIATION DAMAGE
MATERIALS
MONTHLY ACCESSION LIST, ABSTRACT NO. 24527 TO 24600, PART 1,
AD-603 689 DIV. 20
COORDINATE INDEX FOR MONTHLY ACCESSION LISTS FROM 1 OCT 63 TO 31 JUL 64 ON RADIATION DAMAGE,
AD-603 690 DIV. 14

RADIATION DAMAGE
QUARTZ RESONATORS
QUARTZ CRYSTAL AGING EFFECTS,
AD-604 269 DIV. 8

RADIATION DAMAGE
REVIEWS
RADIATION-EFFECTS STATE OF THE ART SURVEY,
AD-603 708 DIV. 20

RADIATION DAMAGE
SINGLE CRYSTALS
LENGTH CHANGE MEASUREMENTS OF ELECTRON-IRRADIATED CADMIUM SULFIDE,
AD-603 606 DIV. 25

RADIATION MEASUREMENT SYSTEMS
ELECTRONIC EQUIPMENT
DEVELOPMENT OF EQUIPMENT TO CONDUCT AREA SURVEY MEASUREMENTS OF THE ELECTROMAGNETIC PULSES FROM NUCLEAR EXPLOSIONS,
AD-603 928 DIV. 20

RADIATION MEASUREMENT SYSTEMS
SUPERCONDUCTORS
SUPERCONDUCTING NUCLEAR PARTICLE DETECTOR,
AD-603 666 DIV. 20

RADIO INTERFERENCE
COMMUNICATION THEORY
STUDY AND INVESTIGATION OF POLARIZATION PROGRAMMING: POLARIZATION SYSTEMS ANALYSIS,
AD-603 624 DIV. 5

RADIO INTERFERENCE
RADIO RECEIVERS
RECEIVER SYSTEM NOISE STUDY,
AD-603 627 DIV. 8

RADIO NAVIGATION
HYPERBOLIC NAVIGATION
OMEGA, A WORLD-WIDE NAVIGATIONAL SYSTEM, SYSTEM SPECIFICATION AND IMPLEMENTATION,
AD-603 784 DIV. 19

RADIO RECEIVERS
CALIBRATION
AVAILABLE-POWER CALIBRATION OF RECEIVING SYSTEMS FOR RADIOPROPAGATION MEASUREMENTS,
AD-603 773 DIV. 8

RADIO RECEIVERS
DESIGN
REFERENCE TEXT ON RADIO FREQUENCY INTERFERENCE CONSIDERATIONS IN RECEIVER DESIGN,
AD-603 792 DIV. 8

RADIO RECEIVERS
SIGNAL-TO-NOISE RATIO
RECEIVER SYSTEM NOISE STUDY,
AD-603 627 DIV. 8
APPLICATIONS OF THE KAC-SIEGERT METHOD FOR FINDING OUTPUT PROBABILITY DENSITIES FOR RECEIVERS WITH SQUARE LAW DETECTORS,
AD-604 083 DIV. 8

RADIO SIGNALS
NUCLEAR EXPLOSIONS
RADIO EMISSION FROM A NUCLEAR EXPLOSION: CRITIQUE AND CORRECTION OF KOMPANEETS COMPUTATION OF THE RADIO SIGNAL,
AD-603 709 DIV. 20

RADIO TRANSMITTERS
RADIOFREQUENCY INTERFERENCE
INTERFERENCE CONSIDERATIONS IN TRANSMITTER DESIGN,
AD-603 847 DIV. 8

RADIO WAVES
HEATING
STUDIES IN THE HEATING OF A SUPERSONIC GAS STREAM BY A RADIO FREQUENCY DISCHARGE,
AD-604 193 DIV. 9

RADIO WAVES
PROPAGATION
GREAT-CIRCLE AND DEVIATED-PATH OBSERVATIONS ON CW SIGNALS USING MODIFIED PINWHEEL TECHNIQUES,
AD-603 772 DIV. 2
AVAILABLE-POWER CALIBRATION OF RECEIVING SYSTEMS FOR RADIOPROPAGATION MEASUREMENTS,
AD-603 773 DIV. 8
POLAR HIGH FREQUENCY RADIO PROPAGATION STUDY,
AD-604 248 DIV. 5

RADIOACTIVE FALLOUT
DECONTAMINATION
PROTOTYPE MANUAL FOR PLANNING, ANALYZING AND SCHEDULING FOR RADIOLOGICAL EXPOSURE,
AD-603 640 DIV. 18

RADIOACTIVE FALLOUT
GEOPHYSICS
TIME BEHAVIOR OF CHARGED PARTICLES INJECTED BY 1962 HIGH ALTITUDE RUSSIAN NUCLEAR TESTS,
AD-603 599 DIV. 20

RADIOACTIVE ISOTOPES
ECONOMICS
SOME ECONOMIC ASPECTS OF FISSIONABLE MATERIAL,
AD-604 287 DIV. 20

RADIOBIOLOGY
TISSUES (BIOLOGY)
EFFECTS OF IONIZING RADIATION ON MAMMALIAN BIOCHEMISTRY: PROTECTIVE AND THERAPEUTIC AGENTS AGAINST RADIATION INJURY; INFLUENCE OF GAMMA AND FAST NEUTRON IRRADIATION ON LIFE SPAN,
AD-603 581 DIV. 16

RADIOFREQUENCY INTERFERENCE
ELECTRIC ARCS
INTERFERENCE STUDIES, INVESTIGATIONS, AND TESTS CONCERNING ELECTRIC ARC-PRODUCING DEVICES INCLUDING ELECTROMAGNETIC RELAYS, SOLID STATE SWITCHING CIRCUITS AND GERMICIDAL LAMPS,
AD-603 933 DIV. 8

STATISTICS IN SIGNAL PROCESSING THEORY. I,
AD-603 710 DIV. 8

SIGNALS
OPTIMIZATION
ON THE OPTIMUM DESIGN OF MULTIPATH SIGNALS,
AD-603 391 DIV. 8

SIGNAL-TO-NOISE RATIO
RADIO RECEIVERS
APPLICATIONS OF THE KAC-SIEGERT METHOD FOR FINDING OUTPUT PROBABILITY DENSITIES FOR RECEIVERS WITH SQUARE LAW DETECTORS,
AD-604 083 DIV. 8

SIGNAL-TO-NOISE RATIO
STATISTICAL ANALYSIS
DETECTION OF A SINE WAVE IN GAUSSIAN NOISE,
AD-604 131 DIV. 8

SIGNAL-TO-NOISE RATIO
VIDEO SIGNALS
TRANSLATION OF RUSSIAN RESEARCH: NOISE IMMUNITY OF TELEVISION SYSTEMS
RANDOM NOISE IN TELEVISION,
AD-603 550 DIV. 5

SILANES
CHEMICAL BONDS
INFRARED STUDY OF THE EFFECT OF SOLVENT ON THE SI-H STRETCHING VIBRATION,
AD-603 678 DIV. 4

SILANES
FLUORESCENCE
LUMINESCENT PROPERTIES OF MIXED PHENYL-AND BIPHENYL SILANES,
AD-603 615 DIV. 4

SILICON
IMPURITIES
SILICON DEVICE DIFFUSION TECHNOLOGY,
AD-603 716 DIV. 25

SILICON COATINGS
VANADIUM ALLOYS
HIGH-TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS,
AD-603 774 DIV. 14

SILICON COMPOUNDS
PHTHALOCYANINES
SYNTHESIS, PURIFICATION, AND HYDROLYSIS OF DICHLORO(PHTHALOCYANINO)SILICON,
AD-604 118 DIV. 4

SILVER ALLOYS
PHYSICAL PROPERTIES
MECHANICAL PROPERTIES AND ELECTRICAL RESISTIVITY OF THE HEXAGONAL AG-AL INTERMETALLIC PHASE,
AD-603 543 DIV. 17

SINGLE CRYSTALS
FRACTURE (MECHANICS)
CRACK INITIATION IN METALLIC MATERIALS: LITHIUM FLUORIDE CRYSTALS AND AISI 301 STAINLESS STEEL,
AD-603 785 DIV. 17

SKY BRIGHTNESS
EXPERIMENTAL DATA
HIGH ALTITUDE DAYTIME SKY BACKGROUND RADIATION MEASUREMENT PROGRAM, PART I. SKY LUMINANCE, POLARIZATION, AND ALBEDO DATA FROM RESEARCH VEHICLE NO. 1,
AD-604 031 DIV. 2
HIGH ALTITUDE DAYTIME SKY BACKGROUND RADIATION MEASUREMENT PROGRAM, PART II. SKY SPECTRAL RADIANCE FROM RESEARCH VEHICLE NO. 1,
AD-604 032 DIV. 2

SLEEP
NERVOUS SYSTEM
NEUROPHYSIOLOGICAL INHIBITORY SYSTEMS ACTIVE DURING SLEEP,
AD-603 737 DIV. 14

SLOT ANTENNAS
ANTENNA RADIATION PATTERNS
STUDY AND INVESTIGATION OF A UHF-VHF ANTENNA,
AD-603 742 DIV. 8

SLOT ANTENNAS
ISOTROPISM
RECTANGULAR CAVITY SLOT ANTENNA WITH HOMOGENEOUS ISOTROPIC LOADING,
AD-603 457 DIV. 8

SOCIAL COMMUNICATION
SOCIOLOGY
SOCIOLOGICAL ASPECTS OF THE INFORMATION PROCESS,
AD-604 235 DIV. 32

SOCIAL COMMUNICATION
WORD ASSOCIATION
AN ANALYSIS OF THE METHOD OF TRIADS IN RESEARCH ON THE MEASUREMENT OF MEANING,
AD-603 944 DIV. 28

SOCIAL SCIENCES
WARFARE
WAR AND PEACE,
AD-604 294 DIV. 32

SODIUM
RESISTANCE (ELECTRICAL)
RESISTIVITY OF SOLID AND LIQUID SODIUM,
AD-604 178 DIV. 25

SOLAR RADIATION
COSMIC RAYS
RELATIONSHIP BETWEEN ABSOLUTE SOLAR COSMIC RAY INTENSITY AND RIOMETER ABSORPTION,
AD-604 197 DIV. 2

SOLID ROCKET PROPELLANTS
MECHANICAL PROPERTIES
EXPERIMENTAL DETERMINATION OF MECHANICAL RESPONSE OF SOLID ROCKET PROPELLANT UNDER HIGH STRAIN RATE AND LOW TEMPERATURE,
AD-603 871 DIV. 10
SOLID PROPELLANT MECHANICAL PROPERTIES: STRAIN RATE INVESTIGATIONS WITH NH4CLO4/AL-FILLED POLYBUTADIENE AND POLYURETHANE,
AD-604 109 DIV. 10

SOLID ROCKET PROPELLANTS
MODELS (SIMULATIONS)
RHEOLOGICAL BEHAVIOR OF A FILLED ELASTOMER: MODELING OF SOLID ROCKET PROPELLANTS,
AD-604 019 DIV. 10

SOLID SOLUTIONS
CADMIUM COMPOUNDS
HOMOGENEITY OF CADMIUM SELENIDE-CADMIUM SULFIDE SOLID SOLUTIONS BY X-RAY FLUORESCENCE,
AD-603 604 DIV. 25

SOLID SOLUTIONS
THERMOCHEMISTRY
SOME ASPECTS OF HETEROGENEOUS EQUILIBRIA: EQUILIBRIA BETWEEN METAL SOLUTIONS AND OXIDE SOLUTIONS IN ATMOSPHERES OF KNOWN PARTIAL PRESSURE OF OXYGEN,
AD-603 555 DIV. 17

SONAR RECEIVERS
ACOUSTIC IMPEDANCE
COMPARISON OF SEVERAL METHODS OF CALCULATING PISTON VELOCITIES OF AN ARRAY IN RECEPTION,
AD-603 590 DIV. 6

SONIC BOOM
PROPAGATION
SONIC-BOOM WAVES IN STRONG WINDS,
AD-603 575 DIV. 25

SOUND
ELECTROMAGNETIC WAVE REFLECTIONS
DIFFRACTION OF LIGHT BY SOUND,
AD-603 745 DIV. 25

SOUND
PROPAGATION
THEORETICAL STUDY OF THE PROPAGATION OF INFRASONIC WAVES IN THE ATMOSPHERE, EXTENSION OF THE METHOD OF NORMAL MODES TO WAVE PROPAGATION IN AN ALMOST-STRATIFIED MEDIUM,
AD-603 817 DIV. 25

SOUND TRANSMISSION
FLUID FLOW
TRANSMISSION OF SOUND IN A MOVING FLUID,
AD-604 123 DIV. 25

SOUNDING ROCKETS
METEOROLOGY
A PRELIMINARY EVALUATION OF THE CRICKETSONDE ROCKET SYSTEM,
AD-603 592 DIV. 2

SOUNDING ROCKETS
PROBES (ELECTROMAGNETIC)
METHODS FOR OBTAINING ELECTRON DENSITY PROFILES FROM CAPACITIVE IONOSPHERIC ROCKET PROBES,
AD-603 625 DIV. 2

SPACE CHARGES
NONLINEAR SYSTEMS
SMALL-SIGNAL NONLINEAR KLYSTRON WAVES,
AD-603 573 DIV. 8

SPACE CREWS
MANNED SPACECRAFT
INVESTIGATION OF AEROSPACE VEHICLE CREW STATION CRITERIA,
AD-603 784 DIV. 12

SPACE CREWS
SURVIVAL
INVESTIGATION OF LOCATION AND RETRIEVAL CRITERIA FOR RE-ENTRY CREW ESCAPE SYSTEMS,
AD-603 759 DIV. 12

SPACE ENVIRONMENTAL CONDITIONS
PHYSICS
INTERPLANETARY MEDIUM PHYSICS AND COMET TAILS,
AD-603 780 DIV. 2

SPACE MEDICINE
ASTRONAUTS
X-20A FULL-PRESSURE SUIT QUANTITATIVE PERFORMANCE,
AD-603 701 DIV. 16
FINGER DEXTERITY OF THE PRESSURE-SUITED SUBJECT,
AD-603 705 DIV. 16

SPACE NAVIGATION
FEASIBILITY STUDIES
UNCERTAINTY IN THE ESTIMATE OF POSITION AND VELOCITY ALONG A LUNAR TRAJECTORY USING INDIVIDUAL EARTH-MOON ANGULAR MEASUREMENTS IN A RECURSIVE NAVIGATION THEORY,
AD-603 936 DIV. 19

SPACE PROPULSION
SEALS (STOPPERS)
DYNAMIC SHAFT SEALS IN SPACE,
AD-603 655 DIV. 47

SPACE SURVEILLANCE SYSTEMS
CONTINUOUS WAVE RADAR
BROADBAND LINEAR ARRAY FOR SPACE SURVEILLANCE SYSTEMS,
AD-603 769 DIV. 6

SPACE SURVEILLANCE SYSTEMS
SCANNING
OPTIMAL LINEAR ESTIMATION FOR A HORIZON SCANNER USED FOR APPROXIMATING THE PITCH ATTITUDE OF AN ORBITING SPACECRAFT,
AD-604 180 DIV. 6

SPACECRAFT
FLIGHT CONTROL SYSTEMS
X-20 FLIGHT CONTROL SYSTEM DEVELOPMENT,
AD-603 704 DIV. 1

SPACECRAFT
PUMPS
INVESTIGATION, DESIGN, AND TEST OF EXPERIMENTAL LIQUID HYDROGEN PUMPS,
AD-603 348 DIV. 12

SPACEFLIGHT
MANNED
STATUS OF ENGINEERING TECHNIQUES IN RELATION TO HUMAN TRAVEL AT UPPER ALTITUDES,
AD-603 994 DIV. 12

SPECIAL FUNCTIONS
ITERATIVE METHODS
AN ITERATIVE METHOD OF COMPUTING THE Q-FUNCTION,
AD-604 004 DIV. 15

SPECIAL FUNCTIONS
STATISTICAL TESTS
POWER FUNCTION OF A SIGN TEST FORMED BY USING SUBSAMPLES,
AD-604 059 DIV. 15

SPECIAL FUNCTIONS (MATHEMATICAL)
INTEGRAL EQUATIONS
SOLUTIONS OF INTEGRAL EQUATIONS RELATED TO THE BESSEL AND MATHIEU FUNCTIONS,
AD-603 982 DIV. 15

SPECIAL FUNCTIONS (MATHEMATICAL)
NUMERICAL ANALYSIS
ON APPROXIMATE EXPRESSIONS FOR THE EXPONENTIAL INTEGRAL AND THE ERROR FUNCTION,
AD-603 898 DIV. 15

SPECIAL PURPOSE COMPUTERS
DATA PROCESSING SYSTEMS
JOSSI A DESIGNER'S VIEW OF AN EXPERIMENTAL ON-LINE COMPUTING SYSTEM,
AD-603 972 DIV. 30

SPECTROPHOTOMETERS
CALIBRATION
ABNORMAL CHARACTERISTICS OF INTERFERENCE FILTERS,
AD-603 632 DIV. 30

SPECTROSCOPY
HIGH ALTITUDE
HIGH ALTITUDE DAYTIME SKY BACKGROUND RADIATION MEASUREMENT PROGRAM, PART I. SKY LUMINANCE, POLARIZATION, AND ALBEDO DATA FROM RESEARCH VEHICLE NO. 1,
AD-604 031 DIV. 2
HIGH ALTITUDE DAYTIME SKY BACKGROUND RADIATION

WHICH IS INSENSITIVE TO NON-RANDOMNESS, AD-603 846 DIV. 15

SOME TEST FOR COMPARING PERCENTAGE POINTS OF TWO ARBITRARY CONTINUOUS POPULATIONS, AD-603 875 DIV. 15

ASYMPTOTIC EFFICIENCY OF CERTAIN NONPARAMETRIC TWO-SAMPLE TESTS, AD-604 075 DIV. 15

SANDWICH CONSTRUCTION
BUCKLING (MECHANICS)
BUCKLING OF AXIALLY COMPRESSED SANDWICH, AD-604 014 DIV. 25

SATELLITES (ARTIFICIAL)
ATTITUDE CONTROL SYSTEMS
AN ANALYSIS OF COMPENSATION TECHNIQUES AND SENSOR NONLINEARITIES IN A MASS EXPULSION SINGLE-AXIS SATELLITE ATTITUDE CONTROL SYSTEM, AD-603 954 DIV. 12

SCHEDULING
DYNAMIC PROGRAMMING
COMBINATORIAL PROBLEMS ARISING IN THE THEORY OF MULTISTAGE PROCESSES, AD-604 284 DIV. 26

SCHEDULING
LINEAR PROGRAMMING
ON THE HITCHCOCK DISTRIBUTION PROBLEM, AD-603 919 DIV. 15

SCHEDULING
MATHEMATICAL PROGRAMMING
COMPUTATIONAL TECHNIQUES FOR SCHEDULING PROBLEMS WITH DEFERRAL COSTS, AD-603 525 DIV. 26

SCHEDULING
OPERATIONS RESEARCH
DIVISIBLE ACTIVITIES IN CRITICAL PATH ANALYSIS, AD-603 940 DIV. 15

SCHEDULING
REFINERIES
MOTOR GASOLINE BLENDING PROBLEM, AD-604 297 DIV. 26

PETROLEUM REFINERY OPERATIONS SCHEDULING, CHAPTER II. CONVENTIONAL METHODS OF REFINERY ECONOMIC ANALYSIS, AD-604 298 DIV. 26

PETROLEUM REFINERY OPERATIONS SCHEDULING, CHAPTER III. A CRUDE OIL ALLOCATION PROBLEM, AD-604 301 DIV. 26

PETROLEUM REFINERY OPERATIONS SCHEDULING, CHAPTER V. A GASOLINE BLENDING PROBLEM, AD-604 302 DIV. 26

PETROLEUM REFINERY OPERATIONS SCHEDULING, CHAPTER IV. A NAPHTHA REFORMING PROBLEM, AD-604 304 DIV. 26

PETROLEUM REFINERY OPERATIONS SCHEDULING, CHAP. VI, CRACKING, RECYCLING, AND BLENDING -AN INTEGRATED REFINERY PROBLEM, AD-604 309 DIV. 26

PETROLEUM REFINERY OPERATIONS SCHEDULING, CHAP. I, INTRODUCTION, AD-604 312 DIV. 26

PETROLEUM REFINERY OPERATIONS SCHEDULING, CHAP. VII, THE ECONOMIST AND THE OPERATIONS SCHEDULER, AD-604 313 DIV. 26

SCIENTIFIC RESEARCH
REPORTS
QUARTERLY PROGRESS REPORT NO. 74, RADIO PHYSICS, PLASMA DYNAMICS, AND COMMUNICATION SCIENCES AND ENGINEERING , AD-603 870 DIV. 30

SCIENTIFIC SATELLITES
PAYLOAD
INVESTIGATION OF THE CHARGED PARTICLE FLUX IN THE NEAR-EARTH MAGNETOSPHERE FROM A P-11 SUB-SATELLITE, AD-603 790 DIV. 2

SEACOAST
STORMS
ASH WEDNESDAY EAST COAST STORM, MARCH 5-8, 1962. A HINDCAST OF EVENTS, CAUSES, AND EFFECTS, AD-603 848 DIV. 2

SEALS (STOPPERS)
LIQUID METALS
DYNAMIC SHAFT SEALS IN SPACE, AD-603 655 DIV. 27

SEISMOLOGY
LIBYA
LIBYAN EARTHQUAKE OF FEBRUARY 21, 1963, AD-603 695 DIV. 2

SEMICONDUCTOR DEVICES
COMPUTER LOGIC
PHYSICAL PHENOMENA FOR LOGICAL FUNCTIONS, AD-604 046 DIV. 25

SEMICONDUCTOR DEVICES
ELECTRONIC SWITCHES
BILATERAL TRIODE SWITCH, AD-603 540 DIV. 8

SEMICONDUCTOR DEVICES
IMAGE INTENSIFIERS (ELECTRONICS)
APPLICATION OF LIGHT AND IMAGE INTENSIFICATION, AD-603 526 DIV. 25

SEMICONDUCTOR DEVICES
LASERS
INJECTION LASER STUDY, AD-603 651 DIV. 25

LASER DEVICES EXPLORATORY INVESTIGATION, AD-604 038 DIV. 25

SEMICONDUCTOR DEVICES
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE, HIGH SPEED SEMICONDUCTOR SWITCH (TWO TERMINAL) HIGH SPEED SEMICONDUCTOR SWITCH (GATE), AD-603 640 DIV. 8

SEMICONDUCTOR DEVICES
MASERS
INVESTIGATION OF MULTIPLE SPIN FLIP PROCESSES TO PRODUCE TRANSITIONS AND INVERSIONS AT ARBITRARY FREQUENCIES, AD-603 553 DIV. 25

SEMICONDUCTOR DEVICES
PREPARATION
SEMICONDUCTOR DEVICE CONCEPTS; DEFECT CHEMISTRY; DIFFUSION OF IMPURITIES; HALOGEN TRANSPORT CRYSTAL GROWTH; LUMINESCENCE, AD-603 783 DIV. 25

SEMICONDUCTOR DEVICES
SILICON
INTEGRATED SILICON DEVICE TECHNOLOGY, VOLUME III, PHOTOENGRAVING, AD-603 715 DIV. 25

SILICON DEVICE DIFFUSION TECHNOLOGY, AD-603 716 DIV. 25

SEMICONDUCTORS
ACOUSTIC PROPERTIES
ACOUSTIC AMPLIFICATION AND ELECTRON MOBILITY IN LITHIUM AND SODIUM DOPED CADMIUM SULFIDE, AD-603 611 DIV. 25

SEMICONDUCTORS
FERROCENES
MEASUREMENTS OF TRUE DARK CONDUCTIVITIES IN FERROCENE CRYSTALS, AD-603 815 DIV. 25

SEMICONDUCTORS
FIELD EMISSION
SURFACE STATES ON HIGH-RESISTIVITY GALLIUM ARSENIDE, AD-603 751 DIV. 8

SURFACE FIELD EFFECT TRANSISTORS BASED ON HIGH-RESISTIVITY GALLIUM ARSENIDE, AD-603 752 DIV. 8

INTEGRATED BANDPASS AMPLIFIERS BASED ON HIGH-RESISTANCE GALLIUM ARSENIDE TRANSISTORS, AD-603 753 DIV. 8

SEMICONDUCTORS
PIEZOELECTRIC CRYSTALS
MICROWAVE INTERACTIONS IN SEMICONDUCTORS; DISTRIBUTED SINGLE CRYSTAL STRUCTURES; SOLID STATE ULTRASONIC AMPLIFIERS AND TRANSDUCERS, AD-603 521 DIV. 8

SEMICONDUCTORS
TRANSPORT PROPERTIES
SEMICONDUCTING COMPOUNDS WITH APPLICATIONS TO THERMOELECTRICITY, AD-604 029 DIV. 25

SEQUENCES
MAPPING (TRANSFORMATIONS)
BROUWER TYPE SPACE TO REPLACE THE CONVENTIONAL PHYSICAL CONTINUUM WHEN PARTICLES ARE REGARDED AS DISTINCTION SYSTEMS, AD-604 044 DIV. 15

SEQUENCES
MATHEMATICAL PREDICTION
WIDE-SENSE MARKOFF SEQUENCES AND RECURSIVE FILTERING, AD-604 041 DIV. 15

SEQUENTIAL ANALYSIS
DECISION THEORY
BAYES AND MINIMAX SOLUTIONS OF SEQUENTIAL DECISION PROBLEMS, AD-603 804 DIV. 15

BAYES MODEL IN SEQUENTIAL DESIGN, AD-604 145 DIV. 15

THE INFLUENCE OF ENVIRONMENTAL NON-STATIONARITY IN A SEQUENTIAL DECISION-MAKING EXPERIMENT, AD-604 156 DIV. 28

SEQUENTIAL ANALYSIS
MATHEMATICAL MODELS
SEQUENTIAL DESIGN OF EXPERIMENTS FOR NON-LINEAR MODELS, AD-604 258 DIV. 30

SERIES
THEOREMS
EXPECTATIONS, POSITIVE TRANSFORMATIONS AND TAUBERIAN THEOREMS, AD-603 884 DIV. 15

SERVOMECHANISMS
ANTENNA COMPONENTS
COMPUTER PROGRAMS FOR HAYSTACK SERVO TESTING, AD-603 794 DIV. 8

SERVOMECHANISMS
TRANSDUCERS
OPTISYN; PHOTOELECTRIC SHAFT-POSITION TRANSDUCER, AD-604 194 DIV. 30

SET THEORY
COMMUNICATION THEORY
CONSTRAINT ANALYSIS OF MANY-DIMENSIONAL RELATIONS, AD-604 042 DIV. 15

SET THEORY
NUMBERS
CONCERNING COMPOUND RANDOMIZATION IN THE BINARY SYSTEM, AD-603 798 DIV. 15

SHEETS
TANTALUM ALLOYS
PILOT PRODUCTION AND EVALUATION OF TANTALUM ALLOY SHEET, AD-604 173 DIV. 17

SHEETS
TENSILE PROPERTIES
EVALUATION OF RHSP TUNGSTEN SHEET, AD-603 592 DIV. 17

SINGLE EDGE CRACKS IN RECTANGULAR TENSILE SHEET, AD-603 855 DIV. 25

SHELTERS
SAFETY
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES, AD-603 661 DIV. 3

SHIELDING
EFFECTIVENESS
GAMMA RADIATION DOSE RATE DISTRIBUTION IN A COMPARTMENTED STEEL STRUCTURE, AD-604 192 DIV. 13

SHIP STRUCTURAL COMPONENTS
STABILIZATION SYSTEMS
USE OF JET-FLAPPED HYDROFOILS AS SHIP ANTIPITCHING FINS, AD-604 011 DIV. 31

SHOCK WAVES
NUMERICAL ANALYSIS
NUMERICAL SOLUTION OF A SPHERICAL BLAST WAVE, AD-604 281 DIV. 9

SHOCK WAVES
SUPERSONIC FLOW
CALCULATIONS OF SUPERSONIC FLOW PAST YAWED CONES BY THE METHOD OF INTEGRAL RELATIONS, AD-603 962 DIV. 9

SHOCK WAVES
THEORY
MAGNETOHYDRODYNAMIC CHARACTERISTICS AND SHOCK WAVES, AD-603 951 DIV. 25

SHOCK (PATHOLOGY)
HEMORRHAGE
PHYSIOLOGY OF PROLONGED OLIGEMIC HYPOTENSION, AD-603 648 DIV. 16

SHROUD RINGS
AERODYNAMIC CHARACTERISTICS
METHOD FOR CALCULATION OF SLIPSTREAM CONTRACTION OF A SHROUDED IMPULSE DISC WITH APPLICATION TO OTHER AXISYMMETRIC POTENTIAL FLOW PROBLEMS, AD-604 127 DIV. 9

SHROUDED PROPELLERS
THEORY
METHOD FOR CALCULATION OF SLIPSTREAM CONTRACTION OF A SHROUDED IMPULSE DISC WITH APPLICATION TO OTHER AXISYMMETRIC POTENTIAL FLOW PROBLEMS, AD-604 127 DIV. 9

SIGNALS
COMMUNICATION THEORY
LIMITING FORMS AND NON-GAUSSIAN

OF FREE BOSON FIELDS,
AD-603 619 DIV. 25

STOCHASTIC PROCESSES
MATHEMATICAL MODELS
BRANCHING PROCESSES,
AD-603 799 DIV. 15
SOME MATHEMATICAL MODELS
FOR BRANCHING PROCESSES,
AD-603 880 DIV. 15

STOCHASTIC PROCESSES
NEUTRON ABSORPTION
STOCHASTIC (MONTE CARLO)
ATTENUATION ANALYSIS,
AD-603 830 DIV. 20

STOCHASTIC PROCESSES
NUMERICAL ANALYSIS
FIRST PASSAGE PROBLEM
FOR A CONTINUOUS MARKOFF
PROCESS,
AD-603 984 DIV. 15

STOCHASTIC PROCESSES
PARTIAL DIFFERENTIAL EQUATIONS
PARTIAL DIFFERENTIAL
EQUATIONS FOR DENSITIES
OF RANDOM PROCESSES,
AD-604 005 DIV. 15

STOCHASTIC PROCESSES
TRANSFORMATIONS
THEORY OF AGE-DEPENDENT
STOCHASTIC BRANCHING
PROCESSES,
AD-603 805 DIV. 15

STORAGE BATTERIES
ALKALINE CELLS
TESTING AND EVALUATION
OF PRIMARY ALKALINE
CELLS AND BATTERIES,
AD-603 581 DIV. 7

STORMS
SEACOAST
ASH WEDNESDAY EAST
COAST STORM, MARCH
5-8, 1962, A HINDCAST
OF EVENTS, CAUSES,
AND EFFECTS,
AD-603 848 DIV. 2

STRAIN (MECHANICS)
AIRCRAFT
A METHOD FOR DETERMINING
THE EFFECTS OF ELEVATED
TEMPERATURE ON STRUCTURAL
DESIGN AND WEIGHT,
AD-604 307 DIV. 1

STRAIN (MECHANICS)
CREEP
TIME-DEPENDENT STRESS-STRAIN
DISTRIBUTIONS,
AD-603 924 DIV. 25

STRAIN (MECHANICS)
MECHANICAL WAVES
CONSTANT STRAIN WAVES
IN STRINGS,
AD-604 164 DIV. 25

STRATEGIC AIR COMMAND
COMMAND + CONTROL SYSTEMS
TEST REPORT FOR MAINTAINABILITY
AND MAN-MACHINE INTERFACE
DEMONSTRATION PLAN,
AD-603 587 DIV. 18

STRATEGIC AIR COMMAND
DATA TRANSMISSION SYSTEMS
TEST REPORT FOR CATEGORY
I ON-SITE ACCEPTANCE
AND INTEGRATION TESTING
OF THE DIGITAL DATA
TRANSFER SYSTEM SUBSCRIBER
A (AN/FYQ-3) WITH THE
REMOTE COMMUNICATIONS
CENTRAL (AN/FYQ-4) AND
THE ELECTRONIC DATA
TRANSMISSION COMMUNICATIONS
AD-603 850 DIV. 5

STRATOSPHERE
OZONE
QUANTITATIVE ANALYSIS
OF TWO PROPOSED MECHANISMS
FOR VERTICAL OZONE TRANSPORT
IN THE LOWER STRATOSPHERE,
AD-603 969 DIV. 2

STRESSES
CONTINUUM MECHANICS
STATIC-GEOMETRIC ANALOGUE
IN THE THEORY OF
COUPLE-STRESSES,
AD-604 175 DIV. 25

STRESSES
CYLINDRICAL BODIES
TORSION OF A CIRCULAR
CYLINDER IN COUPLE
STRESS ELASTICITY,
AD-604 189 DIV. 25

STRESSES
STRUCTURAL PARTS
TIME-DEPENDENT STRESS-STRAIN
DISTRIBUTIONS,
AD-603 924 DIV. 25

STRUCTURAL PARTS
AIRCRAFT
A METHOD FOR DETERMINING
THE EFFECTS OF ELEVATED
TEMPERATURE ON STRUCTURAL
DESIGN AND WEIGHT,
AD-604 307 DIV. 1

STRUCTURAL PARTS
CREEP
EFFECT OF CREEP ON
COLUMN DEFLECTION,
AD-603 811 DIV. 25

STRUCTURAL PARTS
ELASTICITY
THERMAL STRESSES IN
A PARTIALLY CLAMPED
ELASTIC HALF-PLANE,
AD-604 072 DIV. 25

STRUCTURAL PARTS
LOADING (MECHANICS)
IMPULSIVE LOADING ON
AN ELASTIC HALF-PLANE,
AD-604 292 DIV. 25

STRUCTURAL PARTS
STRESSES
EFFECT OF A RIVETED
STRINGER ON THE STRESS
IN A SHEET WITH A
CRACK OR A CUTOUT,
AD-603 693 DIV. 25

STRUCTURAL SHELLS
BUCKLING (MECHANICS)
IMPERFECTIONS, A MAIN
CONTRIBUTOR TO SCATTER
IN EXPERIMENTAL VALUES
OF BUCKLING LOAD,
AD-604 033 DIV. 25

STRUCTURAL SHELLS
CYLINDRICAL BODIES
BUCKLING CHARACTERISTICS
OF CORRUGATED CYLINDERS
-EFFECT OF USING A HIGH
STRENGTH MATERIAL,
AD-603 426 DIV. 13
TRANSIENT RESPONSE OF
A PERIODICALLY SUPPORTED
CYLINDRICAL SHELL IMMERSED
IN A FLUID MEDIUM,
AD-603 862 DIV. 25

STRUCTURAL SHELLS
DEFORMATION
TOROIDAL SHELLS UNDER
INTERNAL PRESSURE IN
THE TRANSITION RANGE,
AD-603 692 DIV. 25

STRUCTURAL SHELLS
MATHEMATICAL ANALYSIS
NONLINEAR SHELL MATRIX
ANALYSIS,
AD-603 527 DIV. 1

STRUCTURAL SHELLS
THEORY
COMPARISONS OF ELASTICITY
AND SHELL THEORY SOLUTIONS,
AD-603 853 DIV. 25

STRUCTURES
LOADING (MECHANICS)
ULTIMATE STRENGTH OF
SINGLE-STORY FRAMES
SUBJECTED TO LOADING,
AD-603 676 DIV. 13

SUBMINIATURE ELECTRONIC EQUIPMENT
POTENTIOMETERS
PRODUCTION ENGINEERING
MEASURE FOR SUBMINIATURE,
TRANSISTOR TYPE POTENTIOMETERS,
AD-603 943 DIV. 8

SULFIDES
RADIATION DAMAGE
LENGTH CHANGE MEASUREMENTS
OF ELECTRON-IRRADIATED
CADMIUM SULFIDE,
AD-603 606 DIV. 25

SUPERAERODYNAMICS
VELOCITY
DIRECT MEASUREMENT OF VELOCITY
DISTRIBUTION FUNCTIONS,
AD-604 252 DIV. 9

SUPERCONDUCTORS
RADIATION MEASUREMENT SYSTEMS
SUPERCONDUCTING NUCLEAR
PARTICLE DETECTOR,
AD-603 666 DIV. 20

SUPERCONDUCTORS
TUNNELING (ELECTRONICS)
ANOMALOUS CURRENT PEAKS
IN THE I-V CHARACTERISTIC
FOR TUNNELING BETWEEN
TWO SUPERCONDUCTORS,
AD-604 097 DIV. 25

SUPERSONIC FLOW
AXIALLY SYMMETRIC FLOW
BOUNDARY LAYER AND
SHOCK WAVE INTERACTIONS
OBSERVED ALONG PROBES
AND WIRES IN SUPERSONIC
AIR STREAMS,
AD-604 111 DIV. 9

SUPERSONIC FLOW
EQUATIONS
SUPERSONIC FLOW AROUND
CONES AT LARGE YAW,
AD-604 291 DIV. 9

SUPERSONIC FLOW
HEATING
STUDIES IN THE HEATING
OF A SUPERSONIC GAS
STREAM BY A RADIO FREQUENCY
DISCHARGE
AD-604 193 DIV. 9

SUPERSONIC FLOW
JETS
INTERFEROMETRIC STUDY
OF A SUPERSONIC AIR
JET AT 60 LB/SQ IN
TANK PRESSURE,
AD-604 112 DIV. 9

SUPERSONIC FLOW
MATHEMATICAL ANALYSIS
CALCULATIONS OF SUPERSONIC
FLOW PAST YAWED CONES
BY THE METHOD OF INTEGRAL
RELATIONS,
AD-603 962 DIV. 9

SUPERSONIC WIND TUNNELS
PROBES (ELECTROMAGNETIC)
APPLICATION OF LANGMUIR
PROBE TECHNIQUES TO
FLOWING IONIZED GASES,
AD-603 668 DIV. 9

SURFACE ACTIVE SUBSTANCES
MONOMOLECULAR FILMS
PHYSICAL AND CHEMICAL
PARAMETERS AFFECTING
THE DAMPING OF CAPILLARY
WATER WAVES BY MONOMOLECULAR
LAYERS OF ORGANIC MATERIALS,
AD-604 249 DIV. 2

SURFACE TENSION
STABILITY
EFFECTS OF SURFACE TENSION
AND VISCOSITY ON TAYLOR
INSTABILITY,
AD-604 215 DIV. 9

SWITCHING CIRCUITS
DESIGN
REFERENCE TEXT ON MISCELLANEOUS
RADIOFREQUENCY INTERFERENCE
CONSIDERATIONS IN SWITCHING
CIRCUITS DESIGN,
AD-603 859 DIV. 8

SWITCHING CIRCUITS
GATES (CIRCUITS)
ANALYSIS AND SYNTHESIS
OF SWITCHING NETWORKS
COMPOSED OF M-OUT-OF-N
DECISION GATES,
AD-604 043 DIV. 7

SWITCHING CIRCUITS
RADIOFREQUENCY INTERFERENCE
INTERFERENCE STUDIES,
INVESTIGATIONS, AND TESTS
CONCERNING ELECTRIC ARC-PRODUCING
DEVICES INCLUDING ELECTROMAGNET-
IC RELAYS, SOLID STATE
SWITCHING CIRCUITS AND
GERMICIDAL LAMPS,
AD-603 933 DIV. 8

SYMMETRY (CRYSTALLOGRAPHY)
FIELD THEORY
REDUCTION OF KRONECKER
PRODUCTS OF SPACE GROUP
REPRESENTATIONS IN THE
FRAME-WORK OF LITTLE
GROUP THEORY,
AD-603 536 DIV. 25

TANKS (CONTAINERS)
TITANIUM ALLOYS
STUDY OF TITANIUM ALLOY
TANKAGE AT CRYOGENIC
TEMPERATURES,
AD-604 053 DIV. 17

TANTALUM ALLOYS
SHEETS
PILOT PRODUCTION AND EVALUATION
OF TANTALUM ALLOY SHEET,
AD-604 173 DIV. 17

TANTALUM CAPACITORS
PRODUCTION
PRODUCTION ENGINEERING
MEASURE FOR CAPACITORS, FEED-
THROUGH, SOLID ELECTROLYTE
TANTALUM PELLET,
AD-603 645 DIV. 8

TAPES
ARRESTING GEAR
PRODUCT IMPROVEMENT PROGRAM
TO PROVIDE EXTRA HIGH
STRENGTH PURCHASE TAPES
FOR THE BAK-9/F4BA AIRCRAFT
ARRESTING BARRIER,
AD-603 596 DIV. 1

TARGET RECOGNITION
POSITION FINDING
EFFECT OF DIRECTION
AND SPEED OF IMAGE
MOTION UPON TARGET DETECTION
WITH SIDE-LOOKING RADAR,
AD-603 598 DIV. 6

TARGETS
SATELLITES (ARTIFICIAL)
DESIGN OF A CONSTANT
ATTITUDE TARGET FOR
RENDEZVOUS WITH REMOTE
MANEUVERING UNIT,
AD-603 617 DIV. 6

TELEVISION CAMERAS
GAS DETECTORS
INSTRUMENTATION FOR FIELD
EVALUATION OF CHEMICAL
AGENTS,
AD-604 093 DIV. 3

TELEVISION COMMUNICATION SYSTEMS
NOISE (RADIO)
TRANSLATION OF RUSSIAN
RESEARCH: NOISE IMMUNITY

MEASUREMENT PROGRAM, PART II, SKY SPECTRAL RADIANCE FROM RESEARCH VEHICLE NO. 1,
AD-604 032 DIV. 2

SPECTROSCOPY
PLASMA PHYSICS
DETERMINATION OF THE TEMPERATURE PROFILE OF AN OPTICALLY THICK CYLINDRICALLY SYMMETRIC LABORATORY PLASMA,
AD-603 685 DIV. 25

SPECTRUM ANALYZERS
INSTRUMENTATION
FAR INFRARED SPECTRUM OF HYDROGEN FLUORIDE,
AD-604 168 DIV. 25

SPIKES
BLUNT BODIES
AERODYNAMIC DRAG ON SPIKED BLUNT BODIES IN LOW-DENSITY HYPERSONIC FLOW,
AD-603 567 DIV. 9

SPIRAL ANTENNAS
ANTENNA RADIATION PATTERNS
STUDY AND INVESTIGATION OF A UHF-VHF ANTENNA,
AD-603 742 DIV. 8

SPUTTERING
ION BEAMS
BASIC PROCESSES OF ION BEAM TERMINATION WITH APPLICATION TO ELECTRIC PROPULSION TEST FACILITY COLLECTOR SYSTEMS,
AD-603 905 DIV. 27

STABILIZATION SYSTEMS
HYDROFOILS
USE OF JET-FLAPPED HYDROFOILS AS SHIP ANTIPITCHING FINS,
AD-604 011 DIV. 31

STAINLESS STEEL
FRACTURE (MECHANICS)
CRACK INITIATION IN METALLIC MATERIALS: LITHIUM FLUORIDE CRYSTALS AND AISI 301 STAINLESS STEEL,
AD-603 785 DIV. 17
THE EFFECT OF FERRITE ON THE MECHANICAL PROPERTIES OF A PRECIPITATION HARDENING STAINLESS STEEL,
AD-603 949 DIV. 17

STAR TRACKERS
RESEARCH PROGRAM ADMINISTRATION
HIGH ALTITUDE DAYTIME SKY BACKGROUND RADIATION MEASUREMENT PROGRAM, PART I, SKY LUMINANCE, POLARIZATION, AND ALBEDO DATA FROM RESEARCH VEHICLE NO. 1,
AD-604 031 DIV. 2
HIGH ALTITUDE DAYTIME SKY BACKGROUND RADIATION MEASUREMENT PROGRAM, PART II, SKY SPECTRAL RADIANCE FROM RESEARCH VEHICLE NO. 1,
AD-604 032 DIV. 2

STARS
OPTICAL PROPERTIES
RADIATIVE OPACITY OF STELLAR MATTER,
AD-604 159 DIV. 2

STARS
PLASMA PHYSICS
THERMAL AND ELECTRICAL CONDUCTIVITY OF COOLING STELLAR PLASMA EMITTING NEUTRINOS,
AD-603 868 DIV. 2

STATISTICAL ANALYSIS
ENGINEERING
PRODUCTS AND QUOTIENTS OF RANDOM VARIABLES AND THEIR APPLICATIONS,
AD-603 667 DIV. 15

STATISTICAL ANALYSIS
MATHEMATICAL MODELS
BAYESIAN ESTIMATION OF MULTIVARIATE REGRESSION,
AD-604 260 DIV. 15

STATISTICAL ANALYSIS
PROBABILITY
LARGE SAMPLE TESTS AND CONFIDENCE INTERVALS FOR MORTALITY RATES,
AD-603 828 DIV. 15

STATISTICAL ANALYSIS
PSYCHOMETRICS
MAXIMUM LIKELIHOOD SOLUTION FOR PAIRED COMPARISONS SCALINGS BY THURSTONE'S CASE V, MAXIMUM LIKELIHOOD SOLUTION FOR SUCCESSIVE INTERVALS SCALING,
AD-604 279 DIV. 28

STATISTICAL ANALYSIS
QUALITY CONTROL
THE FUTURE OF MATHEMATICAL STATISTICS AND QUALITY CONTROL,
AD-603 833 DIV. 32

STATISTICAL ANALYSIS
STATISTICAL TESTS
A TABLE OF PROBABLE REGIONS (A STATISTICAL ALLEGORY),
AD-603 974 DIV. 15

STATISTICAL DISTRIBUTIONS
DISTRIBUTION THEORY
PRODUCTS AND QUOTIENTS OF RANDOM VARIABLES AND THEIR APPLICATIONS,
AD-603 667 DIV. 15
FIRST PASSAGE AND RECURRENCE DISTRIBUTIONS,
AD-603 913 DIV. 15

STATISTICAL FUNCTIONS
BOUNDS ON DENSITIES AND HAZARD RATES,
AD-603 528 DIV. 15

STATISTICAL FUNCTIONS
DISTRIBUTION THEORY
MOMENTA CROSSINGS AS RELATED TO DENSITY CROSSINGS,
AD-603 582 DIV. 15
ON A THEOREM OF DOOB,
AD-603 876 DIV. 15

STATISTICAL FUNCTIONS
INEQUALITIES
DRESHER'S INEQUALITY,
AD-603 918 DIV. 15

STATISTICAL FUNCTIONS
REVIEWS
REVIEW OF FOURIER ANALYSIS AND AUTOCORRELATION,
AD-604 323 DIV. 15

STATISTICAL PROCESSES
DETECTION
LIMITING FORMS AND NON-GAUSSIAN STATISTICS IN SIGNAL PROCESSING THEORY, I,
AD-603 710 DIV. 8

STATISTICAL PROCESSES
FUNCTIONAL ANALYSIS
DISTRIBUTION OF CERTAIN FUNCTIONALS OF MARKOFF PROCESSES,
AD-604 234 DIV. 15
ON THE DISTRIBUTION OF CERTAIN FUNCTIONALS OF MARKOFF PROCESSES,
AD-604 234 DIV. 15

STATISTICAL PROCESSES
THEOREMS
ON A THEOREM OF DOOB,
AD-603 876 DIV. 15

STATISTICAL TESTS
DISTRIBUTION THEORY
POWER FUNCTION OF THE 'BEST' T-TEST SOLUTION OF THE BEHRENSFISHER PROBLEM,
AD-603 825 DIV. 15

STATISTICAL TESTS
EFFECTIVENESS
SOME COMMENTS ON THE EFFICIENCY OF SIGNIFICANCE TESTS,
AD-603 832 DIV. 15

STATISTICAL TESTS
EXPERIMENTAL DATA
NON-PARAMETRIC RESULTS FOR EXPERIMENTAL DESIGNS,
AD-603 894 DIV. 15

STATISTICAL TESTS
NUMBERS
A LARGE SAMPLE TEST OF THE HYPOTHESIS THAT ONE OF TWO RANDOM VARIABLES IS STOCHASTICALLY LARGER THAN THE OTHER,
AD-603 893 DIV. 15

STATISTICAL TESTS
POPULATION (MATHEMATICS)
SOME BOUNDED SIGNIFICANCE LEVEL PROPERTIES OF THE EQUAL-TAIL SIGN TEST,
AD-603 800 DIV. 15
SOME BOUNDED SIGNIFICANCE LEVEL TESTS OF WHETHER THE LARGEST OBSERVATIONS OF A SET ARE TOO SMALL,
AD-603 807 DIV. 15
SOME NON-PARAMETRIC TESTS OF WHETHER THE LARGEST OBSERVATIONS OF A SET ARE TOO LARGE OR TOO SMALL,
AD-603 814 DIV. 15
ESTIMATES AND TESTS BASED ON THE R SMALLEST VALUES IN A SAMPLE,
AD-603 819 DIV. 15
GENERALIZATION OF THE BEHRENS-FISHER PROBLEM,
AD-603 826 DIV. 15
SOME TEST FOR COMPARING PERCENTAGE POINTS OF TWO ARBITRARY CONTINUOUS POPULATIONS,
AD-603 875 DIV. 15

STATISTICAL TESTS
SAMPLING
CONCERNING THE EFFECT OF SMALL CORRELATION ON CERTAIN LARGE SAMPLE TESTS AND CONFIDENCE INTERVALS FOR THE MEAN,
AD-603 840 DIV. 15
ASYMPTOTIC EFFICIENCY OF CERTAIN NONPARAMETRIC TWO-SAMPLE TESTS,
AD-604 075 DIV. 15

STATISTICAL TESTS
SPECIAL FUNCTIONS
POWER FUNCTION OF A SIGN TEST FORMED BY USING SUBSAMPLES,
AD-604 059 DIV. 15
'INFORMATION' LOST BY USING T-TEST WHEN THE POPULATION VARIANCE IS KNOWN,
AD-604 060 DIV. 15

STATISTICAL TESTS
STATISTICAL ANALYSIS
SOME BOUNDED SIGNIFICANCE LEVEL TESTS FOR THE MEDIAN,
AD-603 882 DIV. 15

STATISTICAL TESTS
STATISTICAL DISTRIBUTIONS
LARGE SAMPLE T-STATISTIC WHICH IS INSENSITIVE TO NON-RANDOMNESS,
AD-603 846 DIV. 15

STATISTICAL TESTS
STATISTICAL FUNCTIONS
ON THE POWER FUNCTION OF TESTS OF PERCENTAGE POINTS BASED ON THE NON-CENTRAL T-STATISTIC,
AD-603 831 DIV. 15

STEEL
ELECTROMAGNETIC PROPERTIES
EXPERIMENTAL ELECTROMAGNETIC TEST METHODS FOR THE NONDESTRUCTIVE EVALUATION OF CARBURIZED STEEL PARTS,
AD-603 536 DIV. 26

STEEL
FAILURE (MECHANICS)
RANDOM FATIGUE FAILURE OF A MULTIPLE LOAD PATH REDUNDANT STRUCTURE, AIRCRAFT STRUCTURAL MATERIALS 7075-T6 AND 2024-T4 ALUMINUM AND SAE 4340 STEEL WERE USED,
AD-604 125 DIV. 17

STEEL
IMPACT SHOCK
DYNAMIC STRESS-STRAIN RELATION OF METAL AS DETERMINED FROM IMPACT TESTS WITH A HARD BALL,
AD-603 929 DIV. 17

STEEL
WELDS
PROPERTIES OF WELDED 18NI-7CO-5MO PLATE, WELDING TECHNIQUES, AGING RESPONSE, FRACTURE TOUGHNESS, METALLURGY, AND DELAYED FAILURE SUSCEPTIBILITY,
AD-604 052 DIV. 17

STEREOSCOPIC DISPLAY SYSTEMS
EFFECTIVENESS
STUDIES COMPARING EFFECTIVENESS OF THREE-DIMENSIONAL VERSUS TWO-DIMENSIONAL PRESENTATIONS,
AD-604 017 DIV. 28

STIFFENED CYLINDERS
BUCKLING (MECHANICS)
DYNAMIC BUCKLING OF IMPERFECTION-SENSITIVE STRUCTURES,
AD-603 691 DIV. 13

STIFFENED CYLINDERS
ELASTICITY
COMPARISONS OF ELASTICITY AND SHELL THEORY SOLUTIONS,
AD-603 853 DIV. 25

STIFFENED CYLINDERS
PRESSURE
TRANSIENT RESPONSE OF A PERIODICALLY SUPPORTED CYLINDRICAL SHELL IMMERSED IN A FLUID MEDIUM,
AD-603 862 DIV. 25

STOCHASTIC PROCESSES
CONTROL
BAYESIAN APPROACH TO PROBLEMS IN STOCHASTIC ESTIMATION AND CONTROL,
AD-604 006 DIV. 15

STOCHASTIC PROCESSES
FUNCTIONS
STATISTICAL PROBLEMS CONNECTED WITH STOCHASTIC PROCESSES,
AD-603 887 DIV. 15

STOCHASTIC PROCESSES
LEARNING
STOCHASTIC LEARNING THEORY,
AD-604 160 DIV. 15

STOCHASTIC PROCESSES
LIGHT
STATISTICAL DESCRIPTIONS

ON ULTRAVIOLET SKY RADIATION (AT 330 MILLIMICRONS AND 370 MILLIMICRONS),
AD-603 725 DIV. 2

UNDERWATER OBJECTS
FLUID DYNAMIC PROPERTIES
TURBULENT WAKES IN DENSITY STRATIFIED FLUIDS OF FINITE EXTENT,
AD-604 103 DIV. 9

UNDERWATER SOUND
TRANSDUCERS
MEASUREMENTS ON FREE-FLOODED MAGNETOSTRICTIVE RING TRANSDUCERS FOR DEEP-SUBMERGENCE APPLICATIONS,
AD-603 897 DIV. 25

UPPER ATMOSPHERE
ATMOSPHERE MODELS
TEMPERATURES AND MOTIONS OF THE UPPER ATMOSPHERE,
AD-603 991 DIV. 2

UPPER ATMOSPHERE
PARTICLES
TECHNIQUES FOR IDENTIFICATION HANDLING AND ANALYSIS OF EXTRA-TERRESTRIAL PARTICLES,
AD-603 964 DIV. 2

URBAN AREAS
MATHEMATICAL MODELS
COMPUTER MODEL OF THE SPATIAL ORGANIZATION OF HUMAN ACTIVITIES WITHIN A METROPOLITAN AREA,
AD-603 670 DIV. 2

URBAN PLANNING
HOUSING
MODEL OF RESIDENTIAL LAND VALUES,
AD-603 618 DIV. 32

VAN ALLEN RADIATION BELT
SPECTROSCOPY
INVESTIGATION OF THE CHARGED PARTICLE FLUX IN THE NEAR-EARTH MAGNETOSPHERE FROM A P-11 SUB-SATELLITE,
AD-603 790 DIV. 2

VANADIUM
PARAMAGNETIC RESONANCE
VANADIUM SOLID-STATE CHEMISTRY BY PARAMAGNETIC RESONANCE,
AD-604 181 DIV. 25

VANADIUM ALLOYS
REFRACTORY COATINGS
HIGH-TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS,
AD-603 774 DIV. 14

VARACTOR DIODES
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE FOR GALLIUM ARSENIDE VARACTOR DIODE,
AD-604 030 DIV. 8

VASOACTIVE AGENTS
TOLERANCES (PHYSIOLOGY)
EFFECTS OF SOME TRANQUILIZING, ANALEPTIC AND VASODILATING DRUGS ON PHYSICAL WORK CAPACITY AND ORTHOSTATIC TOLERANCE,
AD-603 930 DIV. 16

VETERINARY MEDICINE
CIVIL DEFENSE
THE ROLE OF THE VETERINARIAN IN NATIONAL DISASTER,
AD-604 276 DIV. 16

VIBRATION
NONLINEAR SYSTEMS
THE SPECTRUM OF RANDOM VIBRATION OF A NONLINEAR OSCILLATOR,
AD-604 047 DIV. 25

VIBRATION
VISUAL ACUITY
EFFECTS OF VIBRATION ON DAL READING PERFORMANCE,
AD-603 963 DIV. 28

VIBRATION ISOLATORS
LANDING IMPACT
BAND-PASS SHOCK ABSORBERS FOR AIRCRAFT LANDING GEAR SHOCK STRUTS,
AD-603 749 DIV. 1

VIBRATION ISOLATORS
UNDERGROUND STRUCTURES
RESPONSE OF FOAM-ISOLATED TUNNEL LININGS TO TRANSIENT LOADINGS,
AD-603 539 DIV. 13

VIDEO SIGNALS
SIGNAL-TO-NOISE RATIO
TRANSLATION OF RUSSIAN RESEARCH; NOISE IMMUNITY OF TELEVISION SYSTEMS RANDOM NOISE IN TELEVISION,
AD-603 550 DIV. 5

VISCOELASTICITY
ANALYSIS
TEMPERATURE-TIME EQUIVALENCE OF THERMORHEOLOGICALLY SIMPLE VISCOELASTIC MATERIALS,
AD-604 020 DIV. 25

VISCOELASTICITY
MATHEMATICAL ANALYSIS
SOME RECENT DEVELOPMENTS IN LINEAR VISCOELASTIC STRESS ANALYSIS,
AD-603 557 DIV. 25
TORSIONAL VIBRATIONS OF A HOLLOW VISCOELASTIC CYLINDER,
AD-603 854 DIV. 25

VISCOELASTICITY
THEORY
SUPERPOSED DEFORMATIONS IN NONLINEAR VISCOELASTICITY,
AD-603 565 DIV. 25

VISCOSITY
STABILITY
EFFECTS OF SURFACE TENSION AND VISCOSITY ON TAYLOR INSTABILITY,
AD-604 215 DIV. 9

VISIBILITY
METEOROLOGICAL PARAMETERS
CORRELATION BETWEEN ATMOSPHERIC BACK-SCATTERING AND METEOROLOGICAL VISUAL RANGE,
AD-604 255 DIV. 2

VISION
CEREBRAL CORTEX
EXPERIMENTS ON 'THE CORTICAL CORRELATE OF PATTERN VISION',
AD-604 245 DIV. 16

VISUAL ACUITY
VIBRATION
EFFECTS OF VIBRATION ON DAL READING PERFORMANCE,
AD-603 963 DIV. 28

VOICE COMMUNICATION SYSTEMS
INDICATOR LIGHTS
ULTRA-SENSITIVE VOICE TRANSMISSION INDICATING CIRCUIT,
AD-604 271 DIV. 5

VULNERABILITY
UNITED STATES
VULNERABILITY OF THE UNITED STATES TO NUCLEAR ATTACK,
AD-604 240 DIV. 18

WAGES
USSR
REAL WAGES IN THE SOVIET UNION, 1928-52,
AD-604 280 DIV. 32

WAKE
TURBULENCE
TURBULENT WAKES IN DENSITY STRATIFIED FLUIDS OF FINITE EXTENT,
AD-604 103 DIV. 9

WARFARE
HISTORY
WAR AND PEACE,
AD-604 294 DIV. 32

WARFARE
MILITARY STRATEGY
SOVIET STRATEGIC DEBATE: AN IMPORTANT RECENT ADDENDUM,
AD-604 272 DIV. 18

WARFARE
PUBLIC OPINION
ATTITUDES TOWARDS THE USE OF FORCE,
AD-604 165 DIV. 32

WATER
ATOMIZATION
ELECTRICAL ATOMIZATION OF VOLATILE LIQUIDS (IONICALLY DOPED WATER AND LIQUID NITROGEN),
AD-603 682 DIV. 25

WATER
DECOMPOSITION
PHOTOCATALYZED DECOMPOSITION OF WATER; INTRAMOLECULAR ELECTRON TRANSFER IN ORGANIC COMPOUNDS,
AD-603 728 DIV. 4

WATER VAPOR
IONIZATION
ATOMIC COLLISION PROCESSES IN ATMOSPHERIC GASES,
AD-603 532 DIV. 4

WATER VAPOR
REACTION KINETICS
SURFACE RECOMBINATION OF OH AND H2 IN THE PRESENCE OF DISTRIBUTED ATOM SOURCES,
AD-604 108 DIV. 4

WATER WAVES
DAMPING
PHYSICAL AND CHEMICAL PARAMETERS AFFECTING THE DAMPING OF CAPILLARY WATER WAVES BY MONOMOLECULAR LAYERS OF ORGANIC MATERIALS,
AD-604 249 DIV. 2

WATER WAVES
GRAVITY
THIRD ORDER STEADY STATE SOLUTIONS FOR INTERSECTING TRAINS OF GRAVITY WAVES,
AD-604 270 DIV. 2

WAVE TRANSMISSION
ATMOSPHERE
THEORETICAL STUDY OF THE PROPAGATION OF INFRASONIC WAVES IN THE ATMOSPHERE, EXTENSION OF THE METHOD OF NORMAL MODES TO WAVE PROPAGATION IN AN ALMOST-STRATIFIED MEDIUM,
AD-603 817 DIV. 25

WAVE TRANSMISSION
VELOCITY
COMPARISON OF SEVERAL METHODS OF CALCULATING PISTON VELOCITIES OF AN ARRAY IN RECEPTION,
AD-603 590 DIV. 4

WAVEGUIDE COUPLERS
LENSES
DESIGN AND OPERATION OF A RADIATING LENS FED BY A GOUBAU BEAM-WAVEGUIDE,
AD-603 552 DIV. 8

WAVEGUIDES
DESIGN
DEVELOPMENT PROGRAM FOR THE FABRICATION AND TESTING OF LIGHTWEIGHT WAVEGUIDE,
AD-603 771 DIV. 8

WAVEGUIDES
DIELECTRICS
ARTIFICIAL DIELECTRICS FOR MATCHING OR ABSORBING EM DEVICES,
AD-603 718 DIV. 8
FREE AND DRIVEN MODES IN ANISOTROPIC PLASMA GUIDES AND RESONATORS,
AD-604 087 DIV. 8

WEAPONS
GOVERNMENT PROCUREMENT
A REVIEW OF THE WEAPONS ACQUISITION PROCESS: ECONOMIC INCENTIVES,
AD-603 973 DIV. 18

WEAPONS
MILITARY STRATEGY
MILITARY DEMONSTRATION AND DISCLOSURE OF NEW WEAPONS,
AD-604 201 DIV. 18

WEATHER FORECASTING
NUMERICAL METHODS AND PROCEDURES
INVERSION OF THE OMEGA-EQUATION,
AD-603 571 DIV. 2

WEATHER FORECASTING
SCIENTIFIC RESEARCH
RESEARCH IN OBJECTIVE WEATHER FORECASTING,
AD-604 049 DIV. 2

WELDING
CASTINGS
MECHANICAL PROPERTIES TESTS OF WELDED A-356-T6 ALUMINUM ALLOY,
AD-604 055 DIV. 26

WELDING
PRESSURE VESSELS
DESIGN, PERFORMANCE, FABRICATION, AND MATERIAL CONSIDERATIONS FOR HIGH-PRESSURE VESSELS,
AD-603 694 DIV. 26

WELDS
ALUMINUM ALLOYS
INVESTIGATION TOWARD OBTAINING SIGNIFICANTLY HIGHER MECHANICAL PROPERTIES OF AS-WELDED JOINTS IN HIGH-STRENGTH, HEAT-TREATABLE ALUMINUM ALLOYS,
AD-603 733 DIV. 26

WELDS
MAGNESIUM ALLOYS
STRESS CORROSION TESTS SOME WROUGHT MG-LI BASE ALLOYS,
AD-603 551 DIV. 17

WELDS
METAL PLATES
PROPERTIES OF WELDED 18NI-7CO-5MO PLATE, WELDING TECHNIQUES, AGING RESPONSE, FRACTURE TOUGHNESS, METALLURGY, AND DELAYED FAILURE SUSCEPTIBILITY,
AD-604 052 DIV. 17

WELDS
MINIATURE ELECTRONIC EQUIPMENT
MICROWELDS FOR MICROASSEMBLIES,
AD-603 566 DIV. 17

WEST GERMANY
ARMAMENT
GERMAN REARMAMENT AND THE OLD MILITARY ELITE,
AD-604 286 DIV. 32

OF TELEVISION SYSTEMS
RANDOM NOISE IN TELEVISION,
AD-603 550 DIV. 5

TEMPERATURE
BOUNDARY LAYER
REFERENCE TEMPERATURE METHOD FOR COMPUTING DISPLACEMENT THICKNESS,
AD-603 585 DIV. 9

TERMINAL FLIGHT FACILITIES
APPROACH LIGHTS
SIMULATOR COMPARISON OF NETHERLANDS LANDING ZONE LIGHTING PATTERNS,
AD-603 863 DIV. 1

TERRESTRIAL MAGNETISM
DIGITAL RECORDING SYSTEMS
SYSTEM FOR AUTOMATIC COLLECTION OF GEOMAGNETIC DATA IN DIGITAL FORM,
AD-603 727 DIV. 2

TEST EQUIPMENT
BAND-PASS FILTERS
ABNORMAL CHARACTERISTICS OF INTERFERENCE FILTERS,
AD-603 632 DIV. 30

TESTES
BIRDS
INVESTIGATION OF THE MECHANISM OF THE CARRY-OVER PERIOD IN THE PHOTOPERIODIC GONADAL RESPONSE IN BIRDS,
AD-603 562 DIV. 16

THERMAL NEUTRONS
NEUTRON CROSS SECTIONS
REGULARITIES IN THERMAL NEUTRON ABSORPTION CROSS SECTIONS,
AD-604 195 DIV. 20

THERMAL RADIATION
MEASUREMENT
DETERMINATION OF THE EFFECTIVE EMITTING TEMPERATURE OF A RADIATING BODY,
AD-604 015 DIV. 25

THERMAL STRESSES
STRUCTURAL PARTS
THERMAL STRESSES IN A PARTIALLY CLAMPED ELASTIC HALF-PLANE,
AD-604 072 DIV. 25

THERMISTORS
PRODUCTION
ML-N19 THERMISTOR PRODUCTION ENGINEERING MEASURE,
AD-603 559 DIV. 8

THERMOCHEMISTRY
SOLID SOLUTIONS
SOME ASPECTS OF HETEROGENEOUS EQUILIBRIA: EQUILIBRIA BETWEEN METAL SOLUTIONS AND OXIDE SOLUTIONS IN ATMOSPHERES OF KNOWN PARTIAL PRESSURE OF OXYGEN,
AD-603 555 DIV. 17

THERMOELECTRICITY
BUOYS
100 WATT THERMOELECTRIC POWER SYSTEM FOR BOUY APPLICATIONS,
AD-603 787 DIV. 7

THERMOELECTRICITY
ENERGY CONVERSION
SEMICONDUCTING COMPOUNDS WITH APPLICATIONS TO THERMOELECTRICITY,
AD-604 029 DIV. 25

THIN FILMS (STORAGE DEVICES)
DISPLAY SYSTEMS
NONDESTRUCTIVE READOUT SCHEME FOR THIN FILM MEMORIES,
AD-603 755 DIV. 30

THRUST
FLIGHT CONTROL SYSTEMS
RADIAL AND BINORMAL THRUSTING TECHNIQUES FOR MANEUVERING SATELLITES IN NEAR EARTH SPACE,
AD-603 699 DIV. 27

THYROID GLAND
ANTIGEN-ANTIBODY REACTIONS
CULTIVATION OF DIPLOID CELL STRAIN WI-38, AND ANTIGENIC CHANGES IN THYROID CELLS,
AD-604 179 DIV. 16

TIME SIGNALS
USSR
TIME SERVICE IN THE USSR,
AD-603 696 DIV. 2

TISSUES (BIOLOGY)
RADIATION EFFECTS
EFFECTS OF IONIZING RADIATION ON MAMMALIAN BIOCHEMISTRY; PROTECTIVE AND THERAPEUTIC AGENTS AGAINST RADIATION INJURY; INFLUENCE OF GAMMA AND FAST NEUTRON IRRADIATION ON LIFE SPAN,
AD-603 561 DIV. 16

TITANIUM ALLOYS
CRYOGENICS
STUDY OF TITANIUM ALLOY TANKAGE AT CRYOGENIC TEMPERATURES,
AD-604 053 DIV. 17
EFFECT OF HYDROGEN CONTENT ON THE MECHANICAL PROPERTIES OF TI-6AL-4V BAR AT -423F,
AD-604 054 DIV. 17

TITANIUM ALLOYS
DEFORMATION
DEFORMATION PROCESSING OF ANISOTROPIC METALS: TITANIUM ALLOY 4 AL-1/402
AD-603 637 DIV. 17

TOPOLOGY
ITERATIVE METHODS
ITERATES OF FRACTIONAL ORDER,
AD-603 821 DIV. 15

TOPOLOGY
THEOREMS
A FURTHER GENERALIZATION OF THE KAKUTANI FIXED POINT THEOREM, WITH APPLICATION TO NASH EQUILIBRIUM POINTS,
AD-603 907 DIV. 15

TOWING VEHICLES
DESERT TESTS
DUST CONCENTRATION MEASUREMENT ON THE U. S. ARMY OVERLAND TRAIN MARK II,
AD-604 027 DIV. 11

TOXINS + ANTITOXINS
BIOLOGICAL ASSAY
NEW METHODS DEVELOPMENT FOR IRRITANT SCREENING,
AD-603 789 DIV. 16

TRAFFIC
VOLUME
TRANSPORTATION OF FREIGHT IN THE USSR,
AD-604 077 DIV. 33

TRAJECTORIES
AIRCRAFT
VARIATIONAL PROBLEMS WITH STATE VARIABLE INEQUALITY CONSTRAINTS,
AD-603 722 DIV. 15

TRANQUILIZERS
TOLERANCES (PHYSIOLOGY)
EFFECTS OF SOME TRANQUILIZING, ANALEPTIC AND VASODILATING DRUGS ON PHYSICAL WORK CAPACITY AND ORTHOSTATIC TOLERANCE,
AD-603 930 DIV. 16

TRANSCENDENTAL FUNCTIONS
NUMERICAL ANALYSIS
RAND COLLECTION OF ILLUSTRATIVE APPROXIMATIONS,
AD-604 136 DIV. 15

TRANSDUCERS
CALIBRATION
INTENSITY MEASUREMENT IN NEAR FIELDS AND REVERBERANT SPACES,
AD-603 713 DIV. 25

TRANSDUCERS
MAGNETOSTRICTIVE ELEMENTS
MEASUREMENTS ON FREE-FLOODED MAGNETOSTRICTIVE RING TRANSDUCERS FOR DEEP-SUBMERGENCE APPLICATIONS,
AD-603 897 DIV. 25

TRANSDUCERS
PHOTOELECTRIC EFFECT
OPTISYN: PHOTOELECTRIC SHAFT-POSITION TRANSDUCER,
AD-604 194 DIV. 30

TRANSFORMATIONS
MAPS
COORDINATE TRANSFORMATION OF MAPS,
AD-604 169 DIV. 2

TRANSFORMATIONS
STOCHASTIC PROCESSES
THEORY OF AGE-DEPENDENT STOCHASTIC BRANCHING PROCESSES,
AD-603 805 DIV. 15

TRANSFORMATIONS (MATHEMATICS)
ANALYSIS
ANALYSIS OF TRANSFORMATIONS (MATHEMATICS)
AD-604 262 DIV. 15

TRANSFORMATIONS (MATHEMATICS)
MATRIX ALGEBRA
EXPECTATIONS, POSITIVE TRANSFORMATIONS AND TAUBERIAN THEOREMS,
AD-603 884 DIV. 15
INTRODUCTION AND BEGINNER'S GUIDE TO MATRIX PSEUDOINVERSES
AD-604 174 DIV. 15

TRANSISTORS
FIELD EMISSION
SURFACE FIELD EFFECT TRANSISTORS BASED ON HIGH-RESISTIVITY GALLIUM ARSENIDE,
AD-603 752 DIV. 8

TRANSISTORS
GERMANIUM
PRODUCTION ENGINEERING MEASURE ON 300 MW -400 MC POWER TRANSISTOR,
AD-603 941 DIV. 8
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS,
AD-604 196 DIV. 8

TRANSISTORS
QUALITY CONTROL
PRODUCTION ENGINEERING MEASURE ON 300 MW -400 MC POWER TRANSISTOR INSPECTION AND QUALITY CONTROL PLAN,
AD-603 942 DIV. 8
COMMON-EMITTER BLOCKING OSCILLATOR OF STABLE DURATION,
AD-603 786 DIV. 8

TRANSPONDERS
AIRBORNE
EVALUATION OF GENERAL AVIATION TRANSPONDERS,
AD-603 864 DIV. 19

TRANSPORTATION
MATHEMATICAL MODELS
CONTINUOUS MODEL OF TRANSPORTATION: COST ANALYSIS,
AD-604 079 DIV. 33

TRANSPORTATION
URBAN AREAS
MODEL OF RESIDENTIAL LAND VALUES,
AD-603 618 DIV. 32

TRIGGER CIRCUITS
INDICATOR LIGHTS
ULTRA-SENSITIVE VOICE TRANSMISSION INDICATING CIRCUIT,
AD-604 271 DIV. 5

TRIODES
ELECTRONIC SWITCHES
BILATERAL TRIODE SWITCH,
AD-603 560 DIV. 8

TRITONS
COSMIC RAYS
ISOTOPIC COMPOSITION OF LOW ENERGY HYDROGEN NUCLEI IN THE PRIMARY COSMIC RADIATION,
AD-604 098 DIV. 2

TUNGSTATES
CALCIUM COMPOUNDS
PLASTIC DEFORMATION OF CALCIUM TUNGSTATE SINGLE CRYSTALS,
AD-604 183 DIV. 25

TUNGSTEN
ELECTRON BOMBARDMENT
EFFECT OF ELECTRON BOMBARDMENT HEATING ON SURFACES OF TUNGSTEN,
AD-604 170 DIV. 17

TUNGSTEN
SHEETS
EVALUATION OF RMSP TUNGSTEN SHEET,
AD-603 542 DIV. 17

TUNNELING (ELECTRONICS)
SUPERCONDUCTORS
ANOMALOUS CURRENT PEAKS IN THE I-V CHARACTERISTIC FOR TUNNELING BETWEEN TWO SUPERCONDUCTORS,
AD-604 097 DIV. 25

TURBULENCE
ACOUSTIC PROPERTIES
FLOW NOISE STUDY OF WATER FLOWING THROUGH PIPES,
AD-603 589 DIV. 9

TURBULENCE
ATMOSPHERIC MOTION
CLEAR-AIR TURBULENCE AND ITS ANALYSIS BY USE OF RAWINSONDE DATA,
AD-603 570 DIV. 2
TWO-DIMENSIONAL SPECTRAL ANALYSIS OF KINETIC ENERGY OVER A CIRCUMPOLAR AREA OF THE EARTH,
AD-603 729 DIV. 2

TURBULENCE
STATISTICAL ANALYSIS
KOLMOGOROV'S HYPOTHESES AND EULERIAN TURBULENCE THEORY,
AD-603 628 DIV. 9
LAGRANGIAN-HISTORY CLOSURE APPROXIMATION FOR TURBULENCE,
AD-603 629 DIV. 9

TWO-DIMENSIONAL FLOW
MAGNETIC FIELDS
SIMILARITY RULES OF THE FLOW OF A PERFECTLY CONDUCTING GAS WITH AN ALIGNED MAGNETIC FIELD,
AD-603 621 DIV. 9

ULTRAVIOLET RADIATION
CLOUD COVER
INVESTIGATION ON THE INFLUENCE OF CLOUDS

AD-DIVISION INDEX

AD No.	Div.
603 520	10
603 521	8
603 522	17
603 523	25
603 525	26
603 526	25
603 527	1
603 528	28
603 530	25
603 531	25
603 532	4
603 533	25
603 534	25
603 535	2
603 536	26
603 537	4
603 538	15
603 539	13
603 540	22
603 541	6
603 542	17
603 543	17
603 544	8
603 545	24
603 546	28
603 547	8
603 548	12
603 549	17
603 550	5
603 551	17
603 552	8
603 553	25
603 554	28
603 555	17
603 556	25
603 557	25
603 558	1
603 559	8
603 560	8
603 561	16
603 562	16
603 563	15
603 564	14
603 565	25
603 566	17
603 567	9
603 568	25
603 569	23
603 570	2
603 571	2
603 572	5
603 573	8
603 574	2
603 575	25
603 576	16
603 577	23
603 578	28
603 579	23
603 580	28
603 581	7
603 582	15
603 583	12
603 584	25
603 585	9
603 586	4
603 587	18
603 588	25
603 589	9
603 590	6
603 591	8
603 592	2
603 593	25
603 594	25
603 595	16
603 596	1
603 597	23
603 598	6
603 599	20
603 600	25
603 601	20
603 602	25
603 603	20
603 604	25
603 605	4
603 606	25
603 607	25
603 608	20
603 609	20
603 610	20
603 611	25
603 612	17
603 613	25
603 614	20
603 615	4
603 616	25
603 617	6
603 618	32
603 619	25
603 620	4
603 621	9
603 622	5
603 623	25
603 624	5
603 625	2
603 626	13
603 627	8
603 628	9
603 629	9
603 630	7
603 631	10
603 632	30
603 633	24
603 634	8
603 635	8
603 636	4
603 637	17
603 638	22
603 639	6
603 640	18
603 641	18
603 642	18
603 643	7
603 644	3
603 645	8
603 646	23
603 647	23
603 648	16
603 649	25
603 650	10
603 651	25
603 652	9
603 653	4
603 654	8
603 655	27
603 656	22
603 657	8
603 658	25
603 659	9
603 660	8
603 661	3
603 662	4
603 663	17
603 664	7
603 665	30
603 666	20
603 667	15
603 668	9
603 669	9
603 670	2
603 671	18
603 672	18
603 673	18
603 674	32
603 675	16
603 676	13
603 677	8
603 678	4
603 679	4
603 680	25
603 681	25
603 682	25
603 683	20
603 684	4
603 685	25
603 686	7
603 687	15
603 688	15
603 689	20
603 690	14
603 691	13
603 692	25
603 693	25
603 694	26
603 695	2
603 696	2
603 697	30
603 698	17
603 699	27
603 700	1
603 701	16
603 702	14
603 703	1
603 704	1
603 705	16
603 706	30
603 707	30
603 708	20
603 709	20
603 710	8
603 711	22
603 712	8
603 713	25
603 714	12
603 715	25
603 716	25
603 717	16
603 718	8
603 719	25
603 720	17
603 721	18
603 722	15
603 723	9
603 724	17
603 725	2
603 727	2
603 728	4
603 729	2
603 730	8

WIND
ATMOSPHERIC MOTION
TWO-DIMENSIONAL SPECTRAL ANALYSIS OF KINETIC ENERGY OVER A CIRCUMPOLAR AREA OF THE EARTH,
AD-603 729 DIV. 2

WINDING
FILAMENT WOUND CONSTRUCTION
INTERLAMINAR SHEAR OF FILAMENT-WOUND REINFORCED PLASTICS,
AD-603 564 DIV. 14

WING INLETS
JETS
WIND-TUNNEL INVESTIGATION OF THE EFFECTS OF LEADING-EDGE BLOWING JETS UPON THE LIFT, DRAG, AND PITCHING MOMENT OF A 76 DEGREE DELTA WING,
AD-603 909 DIV. 1

WIRES
ELASTICITY
TORSION OF A CIRCULAR CYLINDER IN COUPLE STRESS ELASTICITY,
AD-604 189 DIV. 21

WORD ASSOCIATION
SOCIAL COMMUNICATION
AN ANALYSIS OF THE METHOD OF TRIADS IN RESEARCH ON THE MEASUREMENT OF MEANING,
AD-603 944 DIV. 20

X-RAY DIFFRACTION ANALYSIS
HIGH-TEMPERATURE RESEARCH
RESEARCH IN HIGH-TEMPERATURE X-RAY DIFFRACTION TECHNOLOGY,
AD-603 584 DIV. 25

YTTRIUM COMPOUNDS
OXIDES
SPECTRA AND ENERGY LEVELS OF EU(3+) IN Y2O3,
AD-603 978 DIV. 4

ZINC
LASERS
RESONANT ENERGY TRANSFER FROM MERCURY TO ZINC IN RELATION TO A GAS LASER,
AD-603 680 DIV. 25

AD No.	Div.
603 959	19
603 960	1
603 961	9
603 962	9
603 963	28
603 964	2
603 965	8
603 966	8
603 967	25
603 968	25
603 969	16
603 970	20
603 971	2
603 972	30
603 973	16
603 974	15
603 975	12
603 976	25
603 978	4
603 979	16
603 980	15
603 981	15
603 982	15
603 983	15
603 984	6
603 986	15
603 987	26
603 988	15
603 989	26
603 990	15
603 991	2
603 992	15
603 993	15
603 994	12
603 995	15
603 996	15
603 997	28
603 998	20
603 999	2
604 000	25
604 001	2
604 002	28
604 003	32
604 004	15
604 005	15
604 006	15
604 007	25
604 008	9
604 009	14
604 010	14
604 011	31
604 012	15
604 013	8
604 014	25
604 015	25
604 016	14
604 017	28
604 018	20
604 019	10
604 020	25
604 021	8
604 022	8
604 023	14
604 024	12
604 025	33
604 026	1
604 027	11
604 028	27
604 029	25
604 030	1
604 031	2
604 032	2
604 033	25
604 034	25
604 036	9
604 037	7
604 038	25
604 039	7
604 040	2
604 041	15
604 042	15
604 043	7
604 044	15
604 045	15
604 046	25
604 047	25
604 048	2
604 049	2
604 050	8
604 051	4
604 052	17
604 053	17
604 054	17
604 055	26
604 056	17
604 058	25
604 059	15
604 060	15
604 061	9
604 062	32
604 063	15
604 064	30
604 065	1
604 066	1
604 067	19
604 068	8
604 069	2
604 070	16
604 071	22
604 072	25
604 073	26
604 074	32
604 075	15
604 076	26
604 077	33
604 078	23
604 079	33
604 080	18
604 081	32
604 082	15
604 083	8
604 084	15
604 085	15
604 086	32
604 087	8
604 088	25
604 089	25
604 090	25
604 091	25
604 092	25
604 093	3
604 094	2
604 095	5
604 096	15
604 097	20
604 098	2
604 099	25
604 100	25
604 101	8
604 102	22
604 103	9
604 104	14
604 105	2
604 106	4
604 107	9
604 108	4
604 109	10
604 110	3
604 111	9
604 112	9
604 113	4
604 114	7
604 115	8
604 116	3
604 117	4
604 118	4
604 119	8
604 120	8
604 121	8
604 122	2
604 123	25
604 125	17
604 127	9
604 128	18
604 129	15
604 130	9
604 131	8
604 132	15
604 133	20
604 134	16
604 135	28
604 136	15
604 137	30
604 138	15
604 139	15
604 140	15
604 141	7
604 142	15
604 143	32
604 144	23
604 145	15
604 146	15
604 147	15
604 148	32
604 149	32
604 150	32
604 151	15
604 152	15
604 153	8
604 154	15
604 155	15
604 156	28
604 157	28
604 158	15
604 159	2
604 160	15
604 161	15
604 162	30
604 163	32
604 164	25
604 165	32
604 166	30
604 167	15
604 168	25
604 169	2
604 170	17
604 171	8
604 172	26
604 173	17
604 174	15
604 175	25
604 176	10
604 177	25
604 178	25
604 179	16
604 180	6
604 181	25
604 182	2
604 183	25
604 184	23
604 185	4
604 186	0
604 188	16
604 189	25

AD No.	Div.
603 731	25
603 732	30
603 733	26
603 734	15
603 735	4
603 736	8
603 737	16
603 738	25
603 739	15
603 740	15
603 742	8
603 743	25
603 744	1
603 745	25
603 746	1
603 747	7
603 748	14
603 749	1
603 750	9
603 751	8
603 752	6
603 753	8
603 754	9
603 755	30
603 756	4
603 757	22
603 758	1
603 759	12
603 760	26
603 761	25
603 762	8
603 763	28
603 764	19
603 765	8
603 766	26
603 768	30
603 769	6
603 770	20
603 771	8
603 772	2
603 773	6
603 774	14
603 775	8
603 776	8
603 777	17
603 778	9
603 779	17
603 780	2
603 781	15
603 782	4
603 783	25
603 784	12
603 785	17
603 786	8
603 787	7
603 788	8

AD No.	Div.
603 789	16
603 790	2
603 791	1
603 792	6
603 793	28
603 794	6
603 795	4
603 796	2
603 797	2
603 798	15
603 799	15
603 800	15
603 801	26
603 802	12
603 803	15
603 804	15
603 805	15
603 806	32
603 807	15
603 808	15
603 809	15
603 810	32
603 811	25
603 812	15
603 813	10
603 814	15
603 815	25
603 816	10
603 817	25
603 818	25
603 819	15
603 820	15
603 821	15
603 822	15
603 823	15
603 824	15
603 825	15
603 826	15
603 827	15
603 828	15
603 829	9
603 830	20
603 831	15
603 832	15
603 833	32
603 834	15
603 835	1
603 836	15
603 837	15
603 838	15
603 839	32
603 840	15
603 841	15
603 842	32
603 843	32
603 844	19

AD No.	Div.
603 845	32
603 846	15
603 847	8
603 848	2
603 849	2
603 850	5
603 851	25
603 852	10
603 853	25
603 854	25
603 855	25
603 856	32
603 857	8
603 858	6
603 859	8
603 860	30
603 861	2
603 862	25
603 863	1
603 864	19
603 865	5
603 866	8
603 867	6
603 868	2
603 869	1
603 870	30
603 871	10
603 872	25
603 873	15
603 874	15
603 875	15
603 876	15
603 877	15
603 878	20
603 879	16
603 880	15
603 881	15
603 882	15
603 883	20
603 884	15
603 885	8
603 886	30
603 887	15
603 888	32
603 889	15
603 890	15
603 891	9
603 892	32
603 893	15
603 894	15
603 895	19
603 896	15
603 897	25
603 898	15
603 899	14
603 900	25

AD No.	Div.
603 901	25
603 902	17
603 904	1
603 905	27
603 906	32
603 907	15
603 908	32
603 909	18
603 910	30
603 911	32
603 912	30
603 913	25
603 914	32
603 915	15
603 916	26
603 917	27
603 918	15
603 919	15
603 920	9
603 921	18
603 923	16
603 924	25
603 925	32
603 926	15
603 927	8
603 928	20
603 929	17
603 930	16
603 931	1
603 932	16
603 933	8
603 934	25
603 935	25
603 936	25
603 937	25
603 938	6
603 939	25
603 940	15
603 941	8
603 942	6
603 943	8
603 944	26
603 945	26
603 946	26
603 947	27
603 948	25
603 949	17
603 950	25
603 951	25
603 952	12
603 953	12
603 954	12
603 955	30
603 956	19
603 957	7
603 958	1

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

1. Aircraft and Flight Equipment

AD-428 237 Div. 1
OTS Prices: HC $2.00/MF $0.50

National Aeronautical Establishment, Ottawa (Ontario).
THE EFFECT OF THRUST VARIATION WITH FORWARD SPEED ON THE STOL PERFORMANCE OF AN OVER-LOADED TILT-WING VTOL AIRCRAFT.
Aeronautical rept.
by B. Neal Jul 63, 32p LR-373A, NRC-7618
Unclassified report

This rept. is an addendum to LR-373, AD-405 740.

Descriptors: (*Vertical take-off planes, Aerodynamic characteristics), Take-off, Landings, Thrust, Variable-incidence wings, Landing fields.

It appears that the take-off manoeuvre is more dependent on the thrust variation with forward speed than the landing manoeuvre. The take-off to and landing from a 50-foot obstacle may be achieved in approximately 500 feet at an all-up-weight between 40 and 50 percent greater than the VTO all-up-weight depending on the thrust variation assumed. (Author)

2. Astronomy, Geophysics and Geography

AD-281 119 Div. 2, 1
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
A REVIEW OF STUDIES RELATING METEOROLOGICAL PARAMETERS TO SNOW CONDITIONS ON THE GREENLAND ICE CAP.
GRD research notes,
by L. S. Koenig. Feb 62, 17p
Proj. 8623, Task 86231
AFCRL 62-259, AFCRL GRD RN79
Unclassified report

Descriptors: (*Greenland, Snow), (*Snow, Greenland), (*Weather forecasting, Greenland), Meteorological parameters, Landing fields, Arctic regions, Temperature, Micrometeorology, All-weather aviation, Surface properties, Density, Wind, Aging (Materials), Trafficability.

Supply missions to Dew Line sites on the Greenland Ice Cap must land on unprepared landing strips. Although 6-hour weather observations are regularly received at Sondrestrom Air Base (the launch point), forecasting the surface conditions at these places poses special problems because site personnel make no snow observations. In the interests of flying safety a study was started to determine if snow surface conditions could be correlated with the reported weather conditions; but an intensive literature search yielded only meagre pertinent information. Sufficient correlation has been established to warrant further work, including the taking of snow and micrometeorological observations at the sites for a 1-year period and the reduction of this data so that reliable charts will be available to pilots who fly these or similar missions. (Author)

5. Communications

AD-415 124 Div. 5, 14
OTS Prices: HC $2.00/MF $0.50

Naval Supply Research and Development Facility, Bayonne, N. J.
OPERATIONAL EVALUATION OF EXPERIMENTAL SIGNAL FLAGS,
by Franz Merz, Jr. and Jack Naimer. Apr 63, 34p
Task NT F015 99 001(1) and (2)
Unclassified report

Descriptors: (*Textiles, Visual signals), (*Visual signals, Textiles), (*Acrylonitrile polymers, Visual signals), Communication systems, Communication equipment, Navy, Colors, Visibility, Naval vessels (Combatant), Cotton textiles, Fibers (Synthetic).

This report deals with an operational evaluation of newly developed acrylic fiber signal flags. It includes an analysis of the reports from the five participating ships. Increased visual range and durability were demonstrated for the new flags, as well as quicker drying and less tendency to soil. The flags are being recommended for adoption, although work will continue to correct some minor shortcomings. (Author)

16. Medical Sciences

PB-160 088 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
A PHOTOELECTRIC DETERMINATION OF METHANOL IN BIOLOGICAL MATERIAL.
Rept. no. 7,
by John D. Gajewski and W. R. Alsdorf, Jr.
24 Jun 48, 12p
Proj. NM007 031
Unclassified report

Descriptors: (*Alcohols, Diagnostic agents), (*Body fluids, Alcohols), Medical equipment, Body fluids, Spectrophotometers, Colorimetric analysis, Chromates, Blood analysis.

A method is described for the determination of methanol in biological material, employing oxidation with potassium dichromate in sulfuric acid solution and measuring the intensity of the dichromate color at 440 millimicrons with the Evelyn photoelectric colorimeter. (Author)

PB-160 102 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
PREVENTION OF ALLOXAN DIABETES BY SODIUM

AD No.	Div.
604 190	17
604 192	13
604 193	9
604 194	30
604 195	20
604 196	8
604 197	2
604 198	15
604 199	25
604 200	25
604 201	18
604 202	30
604 203	15
604 204	30
604 205	15
604 206	15
604 207	15
604 208	10
604 209	30
604 210	15
604 211	26
604 212	15
604 213	9
604 214	15
604 215	9
604 216	15
604 217	15
604 218	32
604 219	15
604 220	32
604 221	15
604 222	15
604 223	15
604 224	30

AD No.	Div.
604 225	30
604 226	30
604 227	32
604 228	8
604 229	23
604 230	32
604 231	15
604 232	15
604 233	15
604 234	15
604 235	32
604 236	15
604 237	30
604 238	15
604 239	15
604 240	18
604 241	15
604 242	15
604 243	15
604 244	18
604 245	16
604 246	33
604 247	25
604 248	5
604 249	2
604 250	8
604 251	15
604 252	9
604 253	1
604 254	8
604 255	2
604 256	8
604 257	15
604 258	30

AD No.	Div.
604 259	15
604 260	15
604 261	15
604 262	15
604 263	4
604 264	15
604 265	15
604 266	15
604 268	4
604 269	8
604 270	2
604 271	5
604 272	18
604 273	25
604 274	16
604 275	16
604 276	16
604 277	26
604 278	14
604 279	28
604 280	32
604 281	9
604 282	15
604 283	15
604 284	26
604 285	15
604 286	32
604 287	20
604 288	15
604 289	15
604 290	30
604 291	9
604 292	25
604 293	15

AD No.	Div.
604 294	32
604 295	15
604 296	15
604 297	26
604 298	26
604 299	26
604 300	15
604 301	26
604 302	26
604 303	25
604 304	26
604 305	15
604 306	18
604 307	1
604 308	15
604 309	26
604 310	25
604 311	32
604 312	26
604 313	26
604 314	23
604 315	32
604 316	30
604 317	15
604 318	15
604 319	15
604 320	16
604 321	18
604 322	16
604 323	15
604 324	18
604 325	18
604 326	32

was degraded in two stages to a nitrogen-free oil. Oxidation and hydrolysis of the Hofmann degradation product gave 12-ketotetradecanoic and dodecandioic acids. The keto acid was synthesized for comparison with the degradation product. On the basis of the accumulated evidence, the authors have proposed a structure which is in accord with the chemistry of carpaine. (Author)

PB-160 168 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
DEMONSTRATION OF CORROSION CASTS IN RELATIONSHIP TO GROSS MORPHOLOGY BY EMBEDDING IN CLEAR PLASTIC MODELS.
Research rept., vol. 14, p. 211-226,
by Lloyd A. Hurley and S. N. Stein. 1 Mar 56, 26p
Proj. NM007 081 14 02

Unclassified report

Descriptors: (*Anatomical models, Blood circulation), (*Blood circulation, Frostbite), (*Frostbite, Healing), Freezing, Arteries, Veins, Morphology (Biology), Plastics, Rubber, Necrosis, Inhibition, Legs, Rabbits, Polyester plastics.

The corrosion technique has been an effective method of demonstrating vascular changes in studies on experimental frostbite. It appeared, however, that the corrosion casts would be even more effective if they could be demonstrated in relation to the gross changes that occur in the entire anatomical unit, such as gangrene, ulceration, tissue loss, and scar tissue formation. This was accomplished by a method described in which the corrosion specimens were placed in a latex rubber mold which had been prepared prior to corrosion. Clear Selectron plastic was then poured into this mold, producing a replica of the extremity in which morphological relationships could be easily distinguished. This method of demonstrating structural relationships may have application in other fields of investigation. Such preparations would also be useful teaching aids for the demonstration of normal anatomy. (Author)

PB-160 175 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
DIFFERENTIAL RESPONSE OF BLOOD GLUTATHIONE AND SULFHYDRYL, ASSOCIATED WITH METHEMOGLOBIN FORMATION DUE TO NITRITE AND PARA-AMINOPROPIOPHENONE.
Research rept., vol. 12, p.47-54,
by E. P. Vollmer and M. M. Carey. 24 Feb 54, 10p
Proj. NM007 081 11 06

Unclassified report

Descriptors: (*Alloxan, Diabetes), (*Blood proteins, Glutathione), (*Glutathione, Toxic tolerances), Blood chemistry, Hemoglobin, Erythrocytes, Thiols, Nitrites, Hemoglobin, Rats, Sulfur compunds.

Two components of blood sulfhydryl, measured by methods devised for glutathione and sulfhydryl behaved differently under certain experimental conditions; the concentration of the latter increased while that of the former decreased. This behavior occurred during methemoglobin formation taking place both in vivo and in vitro when a direct methemoglobin-former (nitrite) was used, but only in vivo when an indirectly-acting agent (para-aminopropiophenone) was used. Some quantitative parallelism between the formation of methemoglobin and the formation of new sulfhydryl groups was demonstrated. Alloxan, a poor methemoglobin former, significantly reduced the concentration of blood glutathione without appreciably affecting the sulfhydryl level. Attention was drawn to the similarity between some of the preventive detoxifying effects of sulfhydryl compounds and methemoglobin formers, and it was suggested that common mechanism might be provided through the appearance of new sulfhydryl groups during methemoglobin formation, indicated by these experiments. (Author)

PB-160 192 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE ACCELERATION OF PLASMA COAGULATION BY LOW CONCENTATIONS OF HEPARIN.
Rept. no. 5,
by Eugene P. Cronkite and Frederic W. Ullrich.
30 Jan 48, 18p
Proj. NM007 039

Unclassified report

Descriptors: (*Blood plasma, Coagulation), (*Heparin, Blood coagulation), (*Blood coagulation, Heparin), Radiation sickness, Anticoagulants, Dosage, Prothrombin, Fibrinogen, Thrombin.

The acceleration of plasma coagulation by a low concentration of heparin (0.001 mg. per cc.) is shown to be statistically valid. Evidence that the same phenomenon operates in whole blood is presented. (Author)

PB-160 197 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
ANGIOARCHITECTURAL CHANGES ASSOCIATED WITH RAPID REWARMING SUBSEQUENT TO FREEZING INJURY.
Research rept., vol. 14, p. 237-258,
by Lloyd A. Hurley. 16 Mar 56, 24p
Proj. NM007 081 01

Unclassified report

Descriptors: (*Frostbite, Healing), (*Blood circulation, Frostbite), Exposure, Legs, Rabbits, Freezing, Anatomical models, Vinyl plastics, Necrosis, Inhibition, Arteries, Veins, Mercury.

Severe cold injury is as much a vascular emergency as is sudden arterial occlusion. Recent studies on the effect of rapid thawing following local cold injury indicate that tissue damage need not be completely irreversible. The significant role played by recanalization and revascularization and the development of anastomotic channels in the recovery of the frozen hind limb of the rabbit has been demonstrated radiographically and by corrosion methods. Radiological visualization of the details of the vascular bed by injecting metallic mercury has proven superior to other procedures. Vinyl acetate injected specimens were digested in 37 percent hydrochloric acid to produce casts of the vascular organization. The survival of approximately 70 percent of tissue that had been frozen to a temperature of -15° C. for 18 minutes when rapidly rewarmed lends an optimistic view to the problem of cryopathy. This study indicates that it is of prime importance to maintain vascular integrity if morbidity subsequent to freezing injury is to be reduced. (Author)

PB-160 244 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECTS OF VARIOUS SUBSTANCES ON THE ACUTE TOXICITY AND BLOOD LEVEL OF METHANOL.
Rept. no. 6,
by John E. Gajewski, V. A. Richardson, and W. R. Alsdorf, Jr. 23 Jun 48, 14p
Proj. NM007 031

Unclassified report

NITRITE AND PARA-AMINOPROPIOPHENONE.
Research rept., vol. 12, p. 345-348,
by Erwin P. Vollmer, Mary M. Carey, Ralph G. Golden, and John W. Gillmore. 17 Aug 54, 6p
Proj. NM007 081 11 08

Unclassified report

Descriptors: (*Alloxan, Diabetes), (*Diabetes, Alloxan), (*Glutathione, Toxic tolerances), Blood chemistry, Hemoglobin, Sodium compounds, Nitrites, Toxic tolerances, Inhibition, Rats, Erythrocytes.

Male Long-Evans rats (130-160 gm.) were injected intraperitoneally with 250 mg/kg. of alloxan, one-half hour after subcutaneous injection of sodium nitrite (5 mg.) or para-aminopropiophenone (2-3 mg.). Of 40 animals so treated, 2 died and 2 became diabetic; while of 44 controls, 12 died and 18 survivors became diabetic. Although the use of the two methemoglobin-producing substances was predicated upon their effects on blood sulfhydryl, the mechanism of their protective action is regarded as unexplained. (Author)

PB-160 116 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
A METHOD FOR THE SIMULTANEOUS EXPOSURE OF LARGE NUMBERS OF ANIMALS TO SINGLE DOSE HIGH INTENSITY TOTAL BODY X-RAY RADIATION.
Rept. no. 14,
by William H. Chapman, Clyde R. Sipe, D. C. Eltzholtz, Eugene P. Cronkite, and George H. Lawrence.
12 Aug 48, 14p
Proj. NM007 039

Unclassified report

Descriptors: (*Animals, Whole body irradiation), (*Whole body irradiation, Animals), Laboratory animals, Lethal dosage, Radiation sickness, X rays.

Methods of simultaneously irradiating 400 mice, 96 rats, 48 guinea pigs, 14 rabbits and 6 dogs are described. This is accomplished by disposing animals along a circle of one meter radius at the maximum point of radiation density from the angular beam of a 1000 KV, 3 ma, GE Industrial X-ray tube. By this method the numerous extraneous factors which may influence the mortality of the irradiation illness are neutralized and controlled, placing the study of factors which may influence the lethality of radiation on a better statistical basis. (Author)

PB-160 117 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
A METHOD FOR THE TITRATION OF HEPARIN-LIKE SUBSTANCES IN PLASMA.
Rept. no. 4,
by Fredric W. Ullrich and Eugene P. Cronkite.
23 Dec 47, 48p
Proj. NM007 039

Unclassified report

Descriptors: (*Heparin, Blood coagulation), (*Blood plasma, Coagulation), (*Radiation sickness, Blood coagulation), Volumetric analysis, Diagnostic agents, Blood chemistry, Biological assay, Anticoagulants, Protamines, Radiobiology.

A method of assay of heparin or heparin-like substances in plasma is developed utilizing the anti-heparin and anti-coagulant action of protamine sulphate. The method was evaluated by the assay of heparin in vitro and heparin-like substances in vivo. (Author)

PB-160 156 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE LACK OF CORRESPONDENCE BETWEEN BLOOD SULFHYDRYL CONTENT AND TOLERANCE TO POTASSIUM IN MICE INJECTED WITH GLUTATHIONE.
Research rept., vol. 10, p. 501-510,
by Erwin P. Vollmer, Katherine E. Henry, Mary M. Carey, and David L. Spence. 29 Sep 52, 14p
Proj. NM007 081 11 04

Unclassified report

Descriptors: (*Toxic tolerances, Glutathione), (*Glutathione, Toxic tolerances), (*Potassium, Tolerances (Physiology), Mice, Toxicity, Inhibition, Sulfur compounds, Blood chemistry, Electrolytes (Physiology), Blood proteins, Thiols.

The potassium tolerance of male mice is increased by their pretreatment with oxidized as well as reduced glutathione. The injection of oxidized glutathione results in rapidly increased sulfhydryl (SH) content of the blood. Under the conditions of the experiments the injection of reduced glutathione trebles the blood SH level at one-half hour, after which there is a gradual decline to base level about the fourth hour. Protection against excess of potassium is still demonstrable at the fourth hour and therefore is not dependent directly upon the SH content of the blood. (Author)

PB-160 159 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE LETHAL DOSE OF TOTAL BODY X-RAY IRRADIATION IN SWINE.
Rept. no. 3,
by John L. Tullis, Carl F. Tessmer, Eugene P. Cronkite, and F. W. Chambers, Jr. 22 Dec 47, 16p
Proj. NM007 039

Unclassified report

Descriptors: (*Lethal dosage, Swine), (*Whole body irradiation, Swine), X rays, Radiation sickness, Dosimeters.

Adult, healthy hybrid swine were exposed in groups of eight (four males and four females) to predetermined amounts of total body radiation delivered in succession to each lateral aspect of the body one meter from a 1000 KV, 3ma., x-ray source. The 30-day per cent mortality ploted as a function of the bilaterally administered dose gave an 'S'-shaped curve, the LD50/30 of which was taken by interpolation to be 275 r. (Author)

PB-160 166 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE DEGRADATION OF CARPAINE TO A KETOTETRADECANOIC ACID.
Research rept., vol. 10, p. 759-766,
by Henry D. Baldridge, Jr. and Henry Rapoport.
7 Nov 52, 10p
Proj. NM007 081 13 02

Unclassified report

Descriptors: (*Alkaloids, Decomposition), Drugs, Ketones, Iodides, Ion exchange, Silver compounds, Carbonates, Hydrolysis, Oxidation, Acids, Chemical analysis.

Methyl N-methylcarpamate methiodide was prepared by the alcoholysis and methylation of carpaine with methanol and methyl iodide, respectively. The methocarbonate, formed by an ion exchange with silver carbonate,

Spectra (Visible and ultraviolet), High-speed photography, Electrons, Temperature.

A critical investigation of the applicability of Boltzmann factors and Saha equations to a moving inhomogeneous plasma was carried out. Deviations from local thermal equilibrium are discussed and approximate corrections are presented. Time resolved spectroscopic measurements in the visible and ultraviolet regions of the spectrum and high speed photography were performed on the magnetic compression phase of a preionized plasma with reverse trapped magnetic field in a straight cylindrical single turn coil. The experimental results are compared to predictions as obtained by machine calculations on the basis of a magnetohydrodynamic theory in the two-fluid model. (Author)

26. Production and Management

AD-414 988 Div. 26, 12, 14, 17
OTS Prices: HC $8.75/MF $2.50

Metcut Research Associates, Inc., Cincinnati, Ohio.
MACHINING OF REFRACTORY MATERIALS.
Final rept. for 7 Nov 60-31 May 63,
by Norman Zlatin, Michael Field, William P. Koster, and John V. Gould. Jul 63, 575p
Contract AF33 600 42349, Proj. 7 532a
ASD TDR63 581, ASD TR 7 532a

Unclassified report

Descriptors: (*Refractory materials, Machining), (*Heat-resistant metals and alloys, Machining), (*Machining, Heat-resistant materials), Refractory metal alloys, Tungsten, Niobium alloys, Molybdenum alloys, Tantalum alloys, Nickel alloys, Steel, Phenolic plastics, Stresses, Ceramic fibers, Reinforcing materials, Glass, Ceramic materials, Zirconium compounds, Oxides, Aluminum compounds, Sheets, Machine shop practice, Cutting tools, Drilling, Space craft, Ceramic coatings, Friction, Tool steel, Zirconium alloys, Titanium alloys, Vanadium alloys, Chromium alloys, Cobalt alloys, Iron alloys, Carbon alloys.

Machining characteristics are presented for unalloyed tungsten, molybdenum, columbium and tantalum alloys, Rene 41, B-120 VCA titanium, D6AC steel 52-58R sub c, Refrasil, Pyroceram, zirconium oxide and aluminum oxide coatings. These represent some of the most difficult to machine materials presently being fabricated into aerospace components. Test data is also included on 1) high speed edge milling of high temperature sheet materials and 2) Tornetic system of drilling and tapping. (Author)

27. Propulsion Systems

AD-422 419 Div. 27, 22
OTS Prices: HC $3.00/MF $0.75

Arnold Engineering Development Center,
Arnold Air Force Station, Tenn.
INVESTIGATION OF TWO-NOZZLE CLUSTER DIFFUSER-EJECTOR WITH AND WITHOUT EJECTED MASS,
by James W. Hale. Nov 63, 74p
Contract AF40 600 1000
AEDC TDR63 130, N64 11187

Unclassified report

Descriptors: (*Nozzle clusters, Rockets), (*Diffusers, Nozzle clusters), (*Jet pump, Nozzle clusters), Rocket motor nozzles, Conical nozzles, Configuration, Simulation, Performance (Engineering), Fluid dynamic properties.

The investigation was performed to determine the diffuser-ejector configuration which would best satisfy engine test requirement. Six basic series of diffuser-ejector geometric configurations were selected. Various combinations of nozzle configurations were used to drive the diffuser configurations being tested. The performance of the various diffuser-ejector configurations was obtained both with and without ejected mass from the test cell. The major consideration of the investigation was the effect of the diffuser geometric shape on ejector performance and the effect of ejected mass from the test cell on the ejector performance. Correlation of model data and one-dimensional isentropic relationship between diffuser-to-nozzle throat area ratio, cell-to-nozzle total pressure ratio, and ratio of specific heats is shown.

28. Psychology and Human Engineering

AD-429 835 Div. 28, 16
OTS Prices: HC $1.00/MF $0.50

Navy Medical Neuropsychiatric Research Unit,
San Diego, Calif.
HABITUATION OF THE ORIENTING RESPONSE IN ALERT AND DROWSY SUBJECTS,
by David G. McDonald, Laverne C. Johnson, and David J. Hord. Dec 63, 12p
Grant NSF GB922, Proj. MR005 12 2304
NMNRU 63 17

Unclassified report

Descriptors: (*Adaptation (Physiology), Psychophysiology), (*Attention, Reaction (Psychology)), (*Sleep, Reaction (Psychology)), Autonomic nervous system, Galvanic skin response, Cardiovascular system.

Alert and drowsy subjects (by EEG criterion) were compared in two experiments for psychophysiological habituation of the orienting response. Subjects in Experiment I (N=30) received 10 presentations of a doorbell-type buzzer, and in Experiment II (N=69) they received 10 presentations of a 500 cps tone. Comparisons were made of : (1) galvanic skin response (GSR); (2) spontaneous GSR's between trials; (3) heart rate (HR) responses; (4) finger vascoconstriction responses; (5) finger temperature responses; and (6) respiration. Results showed that there were no differences between groups in GSR; however, the drowsy group showed consistently fewer spontaneous GSR's. Cardiovascular response measures of the drowsy groups showed consistently and significantly greater responses on the later trials and, therefore, no habituation of these responses. This finding was more consistent for HR than vasomotor response. (Author)

PB-166 189 Div. 28, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FORGETTING IN AN ASSOCIATION MEMORY,
by Edward A. Feigenbaum and Herbert A. Simon.
24 May 61, 10p P-2311

Unclassified report

Presented at the National Conference of the

Descriptors: (*Alcohols, Toxic tolerances), (Toxic tolerances, Alcohols), Sodium compounds, Chlorides, Thiamines, Vitamin B complex, Succinates, Methionine, Diphenyl, Nitrates, Thyroid gland, Tissue extracts, Urea, Insulin, Glucose, Drugs, Parenteral infusion.

For rats hypotonic sodium chloride solution (0.45 per cent) administered intraperitoneally provided the most favorable results in lowering the mortality from acute intoxication with methanol. Thiamin, riboflavin, p-aminobenzoic acid, sodium succinate, methionine, dinitrophenol, thyroid and urea had no favorable effect on acute toxicity. Intravenous fluid had no effect on blood methanol level in dogs. Neither insulin with glucose nor dinitrophenol have an appreciable effect on blood methanol levels of these animals. Recovery of the latter group from the intoxication was quicker than that of untreated controls given fluid alone. (Author)

PB-166 130 Div. 16, 20
OTS Prices: HC $3.00/MF $0.75

Quartermaster Research and Engineering Center, Natick, Mass.
USE OF IONIZING GAMMA RADIATION FROM A COBALT-60 SOURCE FOR PRESERVATION OF BACON.
10 Jul 62, rev. 1964 66p
Unclassified report

The Army petition for clearance and approval to the Food and Drug Administration.

Descriptors: (*Radiation effects, Microorganisms), (*Pork, Preservation), (*Irradiated foods, Meat), Ionization, Gamma rays, Radiation hazards, Contamination, Toxicity, Germicides, Clostridium botulinum, Containers, Spores, Food poisoning, Health physics, Dose rates, Packaging, Radioactive isotopes, Radiation tolerance, Food, Hermetic seals, Cobalt.

Scientific data are presented to demonstrate that the food additive, ionizing gamma radiation from a Cobalt-60 source, when applied to hermetically sealed raw bacon in the amount of 4.5 megarad, yields a safe irradiated product, which remains free from toxic and other microbiological spoilage. (Author)

23. Personnel and Training

AD-264 927 Div. 23, 6
OTS Prices: HC $2.00/MF $0.50

Human Resources Research Office, George Washington Univ., Washington, D. C.
RADAR TRACKING ACCURACY AS A FUNCTION OF TRAINING AND TASK VARIABLES,
by Robert D. Baldwin and A. Dean Wright. Oct 64, 26p
HumRRO-TR-73
Contract DA44 188AR02, Proj. OJ95 50 001
Unclassified report

Report on VIGIL II.

Descriptors: (*Radar tracking, Military training), (*Military training, Radar tracking), (*Radar operators, Performance tests), Guided missile personnel, Aptitude tests, Errors, Radar jamming, Azimuth, Simulation, Job analysis.

To evaluate the effect of selected training, personnel, and job factors on accuracy of angle tracking by radar operators, 36 subjects were briefly trained in tracking, half with simulated jamming and half without. Divided into four equal groups, they were tested with simulated targets having alternate headings of 1600 and 4800 mils. Results indicated that pattern and magnitude of tracking errors differed as a function of target heading, and tracking errors tended to increase with task duration. Differences in GT aptitude within a score range of 90-120 were not found to be related to accuracy of aide-rate azimuth tracking. (Author)

25. Physics

AD-291 534 Div. 25, 9
OTS Prices: HC $4.00/MF $1.00

Institute for Aerospace Studies, Univ. of Toronto (Ontario).
AERODYNAMIC SOUND FROM FLUID DILATATIONS. A THEORY OF THE SOUND FROM JETS AND OTHER FLOWS,
by H. S. Ribner. Jul 62, 141p UTIAS-86
AFOSR 3430; N63 10636
Unclassified report

This rept. supersedes UTIA-67, PB-163903, ad-247 443

Descriptors: (*Sound, Jets), (*Acoustics, Fluid flow), Noise, Sources, Convection, Refraction, Doppler effect, Correlation techniques, Integral equations.

The present paper is a revised and extended version of UTIA Report 67 (PB-163903). The computed examples therein were faulty in their choice of acoustic source strength and in its statistical properties. An alternative to the quadrupole theory of flow noise is given in terms of simple sources. In this view the volume of a fluid element fluctuates inversely as the local pressure: part of this dilatation generates sound and another part propagates the sound. For unbounded low speed flows the equivalence of the dilatation integral and Lighthill's quadrupole integral is demonstrated by means of a momentum balance. The power of the formalism employing the dilatation correlation with retarded time is further demonstrated by additional examples. Calculations for simulated jet show how narrow frequency bands of the source spectrum appear greatly broadened by convection of the sources past the observer. Corresponding calculations for the radiated sound field automatically produce the correct Doppler-shifted frequencies without implicit introduction of the shift. A final example for simulated static and subsonically moving jets yields comparative directional intensity plots for supersonic nozzle flow speeds: for the moving jet the directional peak is swept back the expected amount. A particular feature - for either case - is the finite value of this peak. Concurrent developments of the Lighthill theory and the present theory are now in essential agreement on the value.

AD-421 595 Div. 25
OTS Prices: HC $3.00/MF $0.75

Maryland Univ., College Park, Md.
SPECTROSCOPIC MEASUREMENTS ON MAGNETICALLY COMPRESSED HIGH TEMPERATURE PLASMAS.
Scientific rept. no. 1 (Doctoral thesis),
by Goetz K. H. Oertel and H. R. Griem. Jul 63, 93p
Contracts AF19 628 269, AF19 604 4074, Proj. 8647, Task 86471
AFCRL 63 851; N63 22898
Unclassified report

Descriptors: (*Plasma medium, Spectroscopy), Magnetic pinch, Magnetohydrodynamics, Theory,

30. Research and Research Equipment

PB-166 205 Div. 30, 28
OTS Prices: HC $1.00/MF $0.50

Notre Dame Univ., Ind.
HUMAN AND MECHANICAL RECOGNITION,
by Kenneth M. Sayre. May 62, 14p
Unclassified report

Pub. in Methodos, v. XIV, no. 54, p 27-40, 1962 (Milan, Italy).

Descriptors: (*Pattern recognition, Reviews), Artificial intelligence, Perception, Learning, Cybernetics, Programming (Computers).

32. Miscellaneous Arts and Sciences

PB-164 298 Div. 32
OTS Prices: HC $3.00/MF $0.75

System Development Corp., Santa Monica, Calif.
THE METHODOLOGY OF SEMEMIC ANALYSIS WITH SPECIAL APPLICATION TO THE ENGLISH PREPOSITION,
by James H. White. 11 Sep 63, 80p SDC-SP-1339
Unclassified report

Descriptors: (*Language, Analysis), Theory, Machine translation.

The paper describes the stratificational theory with emphasis on sememic analysis and then gives in detail a sememic analysis of the major prepositions in the English language and some conclusions about the linguistic environment of the individual prepositions.

PB-166 187 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Patent Office, Washington, D. C.
U. S. PATENT OFFICE MECHANIZED SEARCHING. Progress rept.
by Don D. Andrews. 18 Apr 58, 12p
Unclassified report

Presented for American Chemical Society, San Francisco, Calif., 14-18 Apr 58.

Descriptors: (*Information retrieval, Patents), (*Punched cards, Patents), (*Patents, Information retrieval), United States government, Steroids, Chemical compounds, Input-output devices, Law.

The Patent Office experience with seven months of routine mechanical searching on a fully operational basis is discussed. The mechanized art is that of the chemical steroid compounds which comprises twelve of approximately 1100 subclasses of Class 260 dealing with organic chemistry. All information in these patents pertaining to steroid compounds has been recorded in a deck of punched cards, one for each patent, by a system already widely publicized. For the actual machine operation the Patent Office has successfully trained file clerks with excellent results. The examiner does only the professional work of propounding the question or questions to be searched and evaluating the legal and scientific significance of the patents selected by the machine. The sole limitation of the present mechanization system is that it inherently is limited to the steroid field by its coding system and thus cannot be extended without change to other subject matter. This however, is the subject of further work by the Patent Office Staff and more may be forthcoming shortly on the problem of a generally applicable system for encoding any chemical compound as well as the various procedures and processes in chemistry.

PB-166 203 Div. 32
OTS Prices: HC $2.00/MF $0.50

Milan Univ. (Italy).
FIRST DRAFT OF AN ENGLISH INPUT PROCEDURE FOR MECHANICAL TRANSLATION,
by Ernst von Glasersfeld. Mar 62, 32p
Unclassified report

Pub. in Methodos, v. XIV, no. 54, p 47-77, 1962 (Milan, Italy).

Descriptors: (*Machine translation, Language), (*Programming (Computers), Machine translation), Italy, Analysis.

The report presents an input procedure for English in machine translation. The procedure is an attempt to achieve operational economy using the concept of (correlational nets). Single sentence input texts, each containing a special 'End Sign,' were employed.

PB-166 204 Div. 32
OTS Prices: HC $5.00/MF $1.00

Office of Science Information Service, National Science Foundation, Washington, D. C.
PREPRINTS FOR SEMINAR ON MECHANICAL TRANSLATION.
Apr 64, 154p
Unclassified report

Papers presented by the Japanese participants in the U. S.--Japan Seminar on Mechanical Translation, Tokyo, Apr 64, under the auspices of Panel II of the U. S.--Japan Committee on Scientific Cooperation.

Descriptors: (*Machine translation, Japan), (*Symposia, Machine translation), Digital computers, Language, Communication theory, Programming (Computers), Analysis.

Contents: Status and problems of mechanical translation in Japan; Psycho-linguistic studies of mechanical translation in Japan; Japanese grammar of the zeroth approximation; English-Japanese translation formulas; Verb patterns for the basis of sentence generation; An approach to the general theory of natural language; Procedure for pre-editing Japanese; Mechanical translation of pre-edited Japanese; A survey of MT oriented hardware in Japan; Models and strategies for MT; Automatic segmentation of Japanese text; Design of the special purpose computer KT-2.

PB-166 211 Div. 32
OTS Prices: HC $4.00/MF $0.75

Pennsylvania Univ., Philadelphia.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PROJECTS. 50. TRANSFORMATIONAL TRANSLATION: ENGLISH TO GERMAN,
by Ilse Langerhans. Aug 63, 104p
Unclassified report

Descriptors: (*Language, Analysis), Theory, Machine translation.

Association of Computing Machinery, Los Angeles, Calif., Aug 61.

Descriptors: (*Learning, Bionics), (*Retention, Interference), (*Data storage systems, Memory), Verbal behavior, Recall, Programming (Computers).

A model of an association memory, the EPAM (Elementary Perceiver and Memorizer), is a learning system, a computer simulation of human verbal learning processes. No stored information in this memory is ever physically destroyed. Yet the behavior which we normally call forgetting occurs because of a loss of access (temporary or permanent) to information stored in a growing net of associations. In this system, forgetting occurs as a direct consequence of normal learning processes)i.e., forgetting is the result of the interference of items later learned with items learned earlier) without the postulation of a separate mechanism. Two experiments with human verbal learning are discussed, and the interference phenomena are explained in terms of the EPAM model. (Author)

PB-166 207 Div. 28, 15
OTS Prices: HC $2.00/MF $0.50

Institute for Research, State College, Pa.
PRE-DECISIONAL PROCESSES RELATED TO PSYCHOPHYSICAL JUDGMENT.
Rept. no. 4,
by Emir H. Shuford, Jr., Raymond A. Wiesen, H. Edward Massengill, and Shizuhiko Nishisato.
May 63, 46p
Grants AF AFOSR85 63, AF AFOSR62 5

Unclassified report

Descriptors: (*Decision theory, Decision making), (*Decision making, Probability), (*Learning, Performance (Human)), Behavior, Psychometrics, Optimization, Retention, Mathematical models.

Five pre-decisional processes related to psychophysical judgment are discussed. The first two are described as learning processes; one reflecting improvement in performance due to additional information about the value of a particular state, the other reflecting improvement in performance due to additional information about the distribution of a sequence of states. The third is described as a forgetting process reflecting changes in the value of information with time. The fourth deals with the efficiency of utilization of existing information and yields a model for response probabilities. The fifth deals with the amount of information required for a decision as related to uncertainty about the value of a particular state. (Author)

PB-166 208 Div. 28, 15
OTS Prices: HC $2.00/MF $0.50

Institute for Research, State College, Pa.
SOME BAYESIAN LEARNING PROCESSES.
Rept. no. 2,
by Emir H. Shuford, Jr. Mar 63, 44p
Grant NSF GS114

Unclassified report

Descriptors: (*Decision theory, Decision making), (*Decision making, Mathematical analysis), (*Probability, Decision theory), Learning, Optimization, Mathematical prediction, Programming (Computers), Psychometrics.

The paper illustrates the technique of degradation as a method for the logical analysis of tasks. A well-defined decision task is degraded by eliminating certain knowledge of the prior probabilities, by delaying payoffs, by withholding knowledge of conditional probabilities, and finally by eliminating the sample data. In each case, a straightforward application of probability theory using Bayes theorem yields an optimal strategy. Each strategy is optimal in that it yields the largest possible total expected utility for repeated performances of the task. The resulting set of degradations is open to two interpretations. One interpretation is that each optimal strategy corresponds to the performance of an ideal decision maker operating under certain constraints. The other interpretation is that each degraded task corresponds to a possible laboratory experiment. In this case, the technique of degradation serves to introduce some structure into the relations between the possible experimental tasks. (Author)

PB-166 209 Div. 28, 15
OTS Prices: HC $2.00/MF $0.50

Institute for Research, State College, Pa.
PRE- AND POST-DECISIONAL PROCESSES OF THE 'FUNGUS-EATER',
Rept. no. 6,
by Masanao Toda. May 63, 26p
Grants NSF G16486, NSF GS114

Unclassified report

Descriptors: (*Decision making, Decision theory), (*Decision theory, Probability), Learning, Behavior, Game theory, Bionics, Data, Psychometrics.

A hypothetical subject, the fungus-eater, is used to simulate a human in the process of making decisions. A theoretical discussion of decision-making processes follows.

29. Quartermaster Equipment and Supplies

AD-417 504 Div. 29, 18
OTS Prices: HC $2.00/MF $0.50

Naval Supply Research and Development Facility, Bayonne, N. J.
EVALUATION OF VEAL, BONELESS, FROZEN, PORTION CUT.
Technical rept. review,
by H. R. Ignall. 2 Jul 63, 29p
Task NT F015 13 002 69 63

Unclassified report

Descriptors: (*Meat, Military requirements), (*Naval procurement, Meat), Frozen foods, Costs, Storage, Tests, Food dispensing, Cooking devices, Navy, Food, Acceptability, Navy budgets.

Laboratory and general mess tests were conducted on a preproduction sample (3,000 lbs) of the portion cut veal in comparison to the currently authorized semi-boneless veal. The test product 'As Received' was a two-category issue (veal cutlets and flaked steaks) with both precut to portion sizes. The currently authorized issue consisted of three categories (roast, chops and stew) with two requiring cutting by cooks before preparation. The new portion cut issue had greater yields, was more economical, saved space and weight, and was easier to prepare than the semi-boneless issue. It was recommended that the test product be authorized for Navy general mess use both ashore and afloat. (Author)

SUBJECT INDEX

Subject	Page	Number
Acoustics	S-4	AD-291 534
Acrylonitrile polymers	S-1	AD-415 124
Adaptation (Physiology)	S-5	AD-429 835
Alcohols	S-1	PB-160 088
	S-3	PB-160 244
Alkaloids	S-2	PB-160 166
Alloxan	S-1	PB-160 102
	S-3	PB-160 175
Anatomical models	S-3	PB-160 168
Animals	S-2	PB-160 116
Attention	S-5	AD-429 835
Blood circulation	S-3	PB-160 168
		PB-160 197
Blood coagulation	S-3	PB-160 192
Blood plasma	S-2	PB-160 117
	S-3	PB-160 192
Blood proteins	S-3	PB-160 175
Body fluids	S-1	PB-160 088
Data storage systems	S-5	PB-166 189
Decision making	S-6	PB-166 208
		PB-166 209
	S-7	PB-166 207
Decision theory	S-6	PB-166 208
		PB-166 209
	S-7	PB-166 207
Diabetes	S-1	PB-160 102
Diffusers	S-5	AD-422 419
Frostbite	S-3	PB-160 168
		PB-160 197
Glutathione	S-1	PB-160 102
	S-2	PB-160 156
	S-3	PB-160 175
Greenland	S-1	AD-281 119
Heat-resistant metals and alloys	S-5	AD-414 988
Heparin	S-2	PB-160 117
	S-3	PB-160 192
Information retrieval	S-7	PB-166 187
Irradiated foods	S-4	PB-166 130
Jet pump	S-5	AD-422 419
Language	S-7	PB-164 298
		PB-166 211
Learning	S-5	PB-166 189
	S-7	PB-166 207
Lethal dosage	S-2	PB-160 159
Machine translation	S-7	PB-166 203
		PB-166 204
Machining	S-5	AD-414 988
Meat	S-6	AD-417 504
Military training	S-4	AD-264 927
Naval procurement	S-6	AD-417 504
Nozzle clusters	S-5	AD-422 419
Patents	S-7	PB-166 187
Pattern recognition	S-7	PB-166 205
Plasma medium	S-4	AD-421 595
Pork	S-4	PB-166 130
Potassium	S-2	PB-160 156
Probability	S-6	PB-166 208
Programming(Computers)	S-7	PB-166 203
Punched cards	S-7	PB-166 187
Radar operators	S-4	AD-264 927
Radar tracking	S-4	AD-264 927
Radiation effects	S-4	PB-166 130
Radiation sickness	S-2	PB-160 117
Refractory materials	S-5	AD-414 988
Rentention	S-5	PB-166 189
Sleep	S-5	AD-429 835
Snow	S-1	AD-281 119
Sound	S-4	AD-291 534
Symposia	S-7	PB-166 204
Textiles	S-1	AD-415 124
Toxic tolerances	S-2	PB-160 156
	S-3	PB-160 244
Vertical take-off planes	S-1	AD-428 237
Visual signals	S-1	AD-415 124
Weather forecasting	S-1	AD-281 119
Whole body irradiation	S-2	PB-160 116
		PB-160 159

NUMBER INDEX

Number	Page	Number	Page	Number	Page	Number	Page
AD-264 927	S-4	AD-428 237	S-1	PB-160 166	S-2	PB-166 187	S-7
AD-281 119	S-1	AD-429 835	S-5	PB-160 168	S-3	PB-166 189	S-5
AD-291 534	S-4	PB-160 088	S-1	PB-160 175	S-3	PB-166 203	S-7
AD-414 988	S-5	PB-160 102	S-1	PB-160 192	S-3	PB-166 204	S-7
AD-415 124	S-1	PB-160 116	S-2	PB-160 197	S-3	PB-166 205	S-7
AD-417 504	S-6	PB-160 117	S-2	PB-160 244	S-3	PB-166 207	S-6
AD-421 595	S-4	PB-160 156	S-2	PB-164 298	S-7	PB-166 208	S-6
AD-422 419	S-5	PB-160 159	S-2	PB-166 130	S-4	PB-166 209	S-6
						PB-166 211	S-7

The paper, giving the transformational translation of a paragraph from Edward Sapir, 'Culture, Language and Personality, Selected Essays,' pp. 178-79, from English into German, strongly confirms the similarity of the kernel sentences and, with very few exceptions, that of the transformational operations for these two languages.

U.S. DEPARTMENT OF COMMERCE FIELD OFFICES

SERVE THE BUSINESS COMMUNITY

The Department of Commerce maintains Field Offices to enable the business community to avail itself locally of Government facilities designed to promote commerce. Working closely with various units in the Department and, when necessary, with other Government agencies, the Field Offices provide business services to manufacturers, wholesalers, retailers, trade publications, trade associations, advertising agencies, research groups, financial institutions, and exporters and importers.

Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field Offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

Among the many services which businessmen have found of value are:

GENERAL

- Management and business aids
- Establishing a new business

BASIC ECONOMIC DATA

- Census data with national and often State and regional breakdowns, on manufacturing wholesaling, retailing, service industries, employment and unemployment, population, housing, agriculture
- Basic records of national income and product, regional trends, balance of payments, foreign aid

MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

PRODUCTION

- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

COOPERATIVE OFFICES

To make the services of the Department of Commerce more widely available, agreements have been entered into with more than 750 Chambers of Commerce, Manufacturers Associations, and similar business groups under which these organizations have become official Cooperative Offices of the Department. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Departmental field office.

Department Field Offices

Albuquerque, N. Mex., 87101, U.S. Courthouse. 247-0311.
Anchorage, Alaska, 99501, Room 306, Loussac-Sogn Building. Phone: BR 2-9611.
Atlanta, Ga., 30303, 75 Forsyth St., N.W. JAckson 2-4121.
Baltimore, Md., 21202, 305 U.S. Customhouse, Gay and Lombard Streets. Phone: PLaza 2-8460.
Birmingham, Ala., 35203, Title Bldg., 2030 Third Ave., North. Phone: 325-3131.
Boston, Mass., 02110, Room 230, 80 Federal Street. CApitol 3-2312.
Buffalo, N.Y., 14203, 504 Federal Building, 117 Ellicott Street. Phone: 842-3208.
Charleston, S.C., 29401, No. 4, North Atlantic Wharf. Phone: 722-6551.
Charleston, W. Va., 25301, 3002 New Federal Office Building, 500 Quarrier Street. Phone: 343-6196.
Cheyenne, Wyo., 82001, 207 Majestic Bldg., 16th & Capitol Ave. Phone: 634-5920.
Chicago, Ill., 60606, Room 1302, 226 West Jackson Blvd. 828-4400.
Cincinnati, Ohio, 45202, 8028 Federal Office Building, 550 Main Street. Phone: 381-2200.
Cleveland, Ohio, 44101, 4th Floor, Federal Reserve Bank Bldg., East 6th St. & Superior Ave. 241-7900.
Dallas, Tex., 75202, Room 1200, 1114 Commerce Street. Riverside 9-3287.
Denver, Colo., 80202, 142 New Custom House, 19th & Stout Street. Phone: 297-3246.
Des Moines, Iowa, 50309, 1216 Paramount Building, 509 Grand Avenue. Phone: 284-4222.
Detroit, Mich., 48226, 445 Federal Bldg. 226-6088.
Greensboro, N.C., 27402, Room 407, U.S. Post Office Building. 273-8234.
Hartford, Conn., 06103, 18 Asylum St. Phone: 244-3530.
Honolulu, Hawaii, 96813, 202 International Savings Bldg., 1022 Bethel Street. Phone: 588667.
Houston, Tex., 77002, 5102 Federal Bldg., 515 Rusk Ave. CA 8-0611.
Jacksonville, Fla., 32202, 512 Greenleaf Building, 208 Laura Street. ELgin 4-7111.
Kansas City, Mo., 64106, Room 2011, 911 Walnut Street. BAltimore 1-7000.
Los Angeles, Calif., 90015, Room 450, Western Pacific Building, 1031 S. Broadway. 688-2830.
Memphis, Tenn., 38103, 345 Federal Office Building, 167 N. Main Street. Phone: 534-3214.
Miami, Fla., 33130, 1628 Federal Office Bldg., 51 S.W. First Avenue. Phone: 350-5267.
Milwaukee, Wis., 53203, Straus Bldg., 238 W. Wisconsin Avenue. Phone: BR 2-8600.
Minneapolis, Minn., 55401, Room 304, Federal Bldg., 110 South Fourth Street. Phone: 334-2133.
New Orleans, La., 70130, 1508 Masonic Temple Bldg., 333 St. Charles Avenue. Phone: 527-6546.
New York, N.Y. 10001, 61st Fl., Empire State Bldg., 350 Fifth Avenue. LOngacre 3-3377.
Philadelphia, Pa., 19107, Jefferson Building, 1015 Chestnut Street. WAlnut 3-2400.
Phoenix, Ariz., 85025, New Federal Bldg., 230 N. First Avenue. Phone: 261-3285.
Pittsburgh, Pa., 15222, 1030 Park Bldg., 355 Fifth Avenue. Phone: 644-2850.
Portland, Oreg., 97204, 217 Old U.S. Courthouse, 520 S.W. Morrison Street. 226-3361.
Reno, Nev., 89502, 1479 Wells Avenue. Phone: FA 2-7133.
Richmond, Va., 23240, 2105 Federal Building, 400 North 8th Street. Phone: 649-3611.
St. Louis, Mo., 63103, 2511 Federal Bldg., 1520 Market Street. MAin 2-4243.
Salt Lake City, Utah, 84111, 3235 Federal Building, 125 South State Street. 524-5116.
San Francisco, Calif., 94102, Federal Building, 450 Golden Gate Avenue. Phone: 556-5864.
Santurce, Puerto Rico, 00907, Room 628, 605 Condado Avenue. Phone: 723-4640.
Savannah, Ga., 31402, 235 U.S. Courthouse and Post Office Bldg., 125-29 Bull Street. ADams 2-4755.
Seattle, Wash., 98104, 809 Federal Office Bldg., 909 First Avenue. MUtual 2-3300.

UNIVERSITY MICROFILMS INC
313 N FIRST STREET
ANN ARBOR MICHIGAN
GRR JUNE

PENALTY FOR PRIVATE USE TO AVOID
PAYMENT OF POSTAGE, $300

GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D.C. 20402

OFFICIAL BUSINESS

OTS *Announces . . .*

the availability of Supplement A to *U. S. Government Research Reports,* Volume 39, Number 5.

This Supplement is one of four being issued to list a group of reports set aside by the Defense Documentation Center in March of this year for later announcement.

Each Supplement contains its own indexes and all reports will be listed in the "Technical Abstract Bulletin" Cumulative Index for this Volume of the *USGRR.*

Supplement A is available free-of-charge upon request to Office of Technical Services, U. S. Department of Commerce, Washington, D. C., 20230.